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CONTENTS

SUMMARY: —
The Plumbers' Strike in New York.—Coöperative Manufacturing at Topeka, Kan.— The coming Opening of Sir John Soane's Rooms in the Temple, London.—Reed and Plaster Planks.—Project to Connect the Paris Boulevards.— The Copyright Convention at Berne, Switzerland.— Stationary-Engine Firemen's Competition. 141
ANCIENT AND MODERN LIGHT-HOUSES.— III. 143
AN EDITOR'S TRIP ABROAD.— XIV. 144
THE ILLUSTRATIONS: —
Interior of a Mosque at Tlemcen, Africa.—Competitive Design for the Library and Museum, Minneapolis, Minn.— Paris Views.— Life Insurance Building, New York, N. Y.—Winstanley's Light-house on Eddystone Rock.—Rudyerd's Light-house on Eddystone Rock. 146
MUNTZ'S RAPHAEL.—II. 146
FIRE-INSURANCE AND ARCHITECTURE. 148
A GEORGIA TURPENTINE FARM. 150
NOTES AND CLIPPINGS. 151
TRADE SURVEYS. 152

A RATHER curious discussion is just now going on in New York among the plumbers, the journeymen being on strike, while the masters are engaged in forming associations to protect themselves. The exact cause of the strike is not very obvious. The journeymen seem to wish to have it understood that they are trying to prevent the masters from having more than a certain number of apprentices, on the ground that those who have too many are tempted to send them to do the work of more competent men; but it is not quite clear that other points are not involved, or may not be before the contest ends. The weak point in the journeymen's argument, which is set forth very calmly and clearly in some of the daily papers, is its failure to show any close connection between apprentices and bad plumbing, and as the *Evening Post* well points out, the sort of work now frequently done by journeymen in good standing in the plumbers' union does not say much for the zeal of its members in their "endeavors to create first-class mechanics," about which they make such loud professions, or indicate that the limited number of apprentices which, if they had their way, would be admitted to the shops, would invariably be properly taught their business. In fact, so far as the teaching of boys goes, it is obviously much more for the interest of the masters to see that those who wish to learn the trade should be thoroughly instructed than for that of the journeymen, and experience in other trades has shown that the workmen's unions generally look with little favor on the technical schools which the masters, who naturally wish to have their apprentices as efficient as possible, encourage with substantial favors. Whether the masters are tempted to risk the lives of their customers by sending these boys, before they are fully instructed, to do work which ought only to be entrusted to men of experience and skill is another thing; but the fact that the master is responsible for all the blunders of his apprentices serves as a wholesome check upon carelessness in this respect, while, so far as the public is concerned, it may be questioned whether the mistakes of a well-meaning apprentice would be more dangerous than the intentional frauds practised by members of the organization which claims to have the public health so much at heart. We have quite as much respect and regard as any one for good plumbers, and would like nothing better than to see their business raised to the standing which it deserves, but so long as they suffer themselves to be associated with the sort of men who do the work in many of our city houses, they must be prepared to find other people incredulous as to their zeal for the elevation of their calling.

WE look forward with considerable apprehension to the result of a disclosure which has recently been made by the *Publishers' Weekly* in regard to a manufacturing firm in Topeka, Kan. It seems that in the summer of 1885 this firm, finding its business unprofitable, addressed a circular to each of its sixty employés, setting forth the condition of affairs, and asking the workmen to try for a year to help themselves and the firm by avoiding waste of materials and time, and endeavoring to make their labor as effective as possible. This seems to have been a new idea to the men, but they reflected upon it, and concluded to try the experiment. After the year had passed, the books of the firm, instead of losses, showed increase of product, and decrease of expenses, sufficient to net a handsome profit, and a second circular was issued, thanking the men for their help in promoting the success of the business, and informing them of an increase in wages, with a reduction in the number of working hours. This change, just as it seems, obviously put the firm at a disadvantage in competing with other establishments, but the men, who were intelligent enough to understand this, undertook to make up for it by still greater care and zeal in their work, and at the last accounts the business was still flourishing, and even increasing, and, judging from the result of similar undertakings, will continue to do so until the Knights of Labor interfere, and command the men to desist from the practice of those habits of economy and forethought which are rapidly raising them above their fellows. It seems incredible that men who have once tasted the sweetness of an improvement in their condition, brought about by their own efforts, should submit, at the order of a selfish demagogue, to return to their old helpless and hopeless routine; but the example of the Massachusetts coöperative shoe-shops, the working owners of which, in the full tide of prosperous business, large dividends, accumulation of surplus to be divided in future, and rapid increase in the value of their stock, deliberately closed their own factories, forfeited their contracts, drove their customers away, and abandoned their costly stock and machinery to rust and decay, simply because a walking delegate told them to do so, shows plainly enough how effectual is the system of terrorizing by which the leaders of the labor organizations maintain their control over their poor and timid victims; and we shall not be surprised to hear at any time that the Topeka establishment has been attacked, on some pretext or other, and either closed altogether or forced to return to the old system.

SIR JOHN SOANE, the architect of the Bank of England building, as well as of many others, not content with the wealth and rank which his professional achievements brought to him, devised some very ingenious methods for keeping his memory fresh in the recollection of the public after his death. Having, we believe, no heirs or near relatives, he bequeathed the house in which he lived, together with its miscellaneous contents, to the nation, and, under the name of the Soane Museum, it still attracts many visitors, particularly from among architects, who can appreciate its casts and fragments, and the numerous cork models of ancient buildings, as well as the Reynolds pictures and the illuminated manuscripts. The house was originally a large one, and is made to appear still larger by being divided into a great number of small rooms. Twenty-four of these are now open to the public, but there are still twenty-two rooms which, by direction of the owner, were sealed up before his death, with the stipulation that the seals should not be broken for fifty years. In November next the time will expire and the rooms will be opened. What will be found in them no one pretends to know. All those who were once familiar with the house, and might recollect something about the disposition of the objects in it, have passed away, and it is doubtful whether the twenty-second of November will bring to light more works of art, or simply some piece of family history. A suggestion has been made that this particular date is in some way connected with the fortunes of the family, and it is said that several of the Soanes have died at that season of the year, but it appears that the instances of this kind have occurred since the decease of Sir John, and as it is hardly probable that he was endowed with a second-sight piercing enough to discover its future fatal connection with his family, it is most likely that the day for the breaking of the seals was simply chosen at random for the first display of works, perhaps architectural designs, which he thought would be more interesting to posterity than to his contemporaries.

ACCORDING to the *Revue Industrielle*, the manufacture has begun in France of a kind of building appliance which promises to be useful, and at the same time cheap. The new material consists simply of planks of reeds embedded in

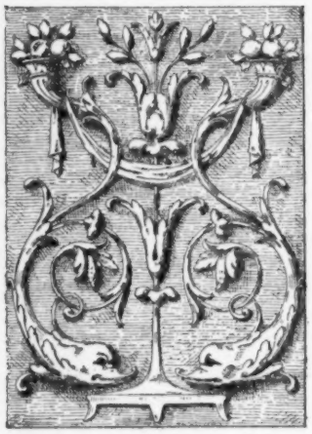
plaster, but the planks are of various thicknesses, and are capable of a great variety of applications. They are readily nailed to a wood framework, or attached by a little plaster to masonry, or to each other, and can be used for furring walls, for making partitions, for deafening floors, or for a hundred other purposes. The process of manufacture is as simple as possible. Four or five wooden planks, about ten feet long, are set vertically on a horizontal table, their ends being separated by strips of wood of the thickness which it is intended to give to the plaster blocks. Plaster-of-Paris and reeds are then put alternately in the spaces between the planks until they are filled, and after the plaster has set, the mould is taken to pieces and the blocks removed and stacked up to dry. The finished material contains about one-half its bulk of reeds, and is, therefore, not only well knit together and tough, but very light and cheap, the weight of pieces one inch thick being about five pounds per square foot, and the cost about three cents for the same quantity. With us, plaster is too expensive a material to be used with economy in this way, but we have great deposits of cement and hydraulic lime which would answer tolerably well in its place, and reeds for the binding material might probably be replaced with considerable advantage by wheat-straw, cornstalks and leaves, or many other waste products of our farms. If well made, a partition of such materials, two or three inches thick, ought to cost, near the place of manufacture, little, if any, more than a stud partition plastered on both sides. Its weight would be about the same as that of a stud partition, so that it could be built on the beams, if necessary, in the same way, and it would have the inestimable advantage of being fireproof.

THE great street in Paris known as the Boulevard Haussman now extends, including that portion of it known as the Avenue Friedland, from the Arc de l'Etoile to the Opéra, just beyond which it suddenly terminates, coming to an end in the Rue Taitbout. From the other side of the city another long and wide street, under the names of the Boulevard Voltaire, and the Boulevards St. Martin, St. Denis, Bonne Nouvelle, Poissonnière and Montmartre, extends from the almost suburban Place de la Nation to a point within ten or twelve hundred feet of the end of the Boulevard Haussman, and then turns at a sharp angle, and, under the name of the Boulevard des Italiens, goes off toward the Madeleine and the Rue de Rivoli. The opposite ends of the Boulevard Haussman and the Boulevard Montmartre are directly in line with each other, and it is not surprising that the idea of connecting them, so as to give to the city a broad avenue of communication between the eastern and western portions, has been long in the minds of the Parisians. Unfortunately, the construction of the Boulevard St. Germain and the Avenue de l'Opéra was so costly as to have given the municipal officials a disinclination to such undertakings, and as the short link which is still wanting in the chain may never be supplied by the public authority, the idea has occurred to certain private citizens to undertake the work themselves, seeking the authority of the city government for the necessary expropriation of land, but paying all expenses, including the cost of tearing down the old buildings in the way of the street, and building new ones along the modified line, and trusting to the improvement in the value of the estates abutting on the new street to repay their outlay, with a profit. The author of the project, according to *La Semaine des Constructeurs*, is an architect, M. Letorey, who is supported by a company, or, as we should say, by a syndicate of capitalists, and has made his estimates carefully enough to be able to submit a matured scheme for the approval of the town authorities. According to his proposal, his company offers to assume all the cost of taking land, pulling down and rebuilding, and constructing the new street, with all its sewers and pavements, under the direction of the municipal administration, asking nothing in return except a guarantee by the city of a certain minimum interest on the outlay for a period of thirty years from the completion and acceptance of the street. The work of reconstruction on the line of the street is to be carried out with great care. A competition is to be held for designs for the new buildings, and they are to contain all modern luxuries in the way of steam-heat, electric lamps, telephones and other appliances for convenience, as well as the most artistic decoration. As security for the return of any payments that may be made by the city on account of its guarantee of interest, the rents of all the new buildings are to be paid into the city treasury during the thirty years of guarantee, and at the end of that time a settlement will be made between the city and the company. The property in the abutting estates will, however, remain meanwhile in the company, which is to have the right to sell any of them, and the amount of the city's yearly guarantee will then be diminished by a sum equal to five per cent on the value of the estate sold. As the new street will be in the heart of the busiest section of Paris, and must immediately receive an immense traffic, the authors of the scheme believe that the work will in the end cost the city nothing, and that they can themselves afford to pay the twelve million dollars which is the estimated expense of the whole, and give the city the cost of sewers, sidewalks and pavements, for the sake of securing the enhancement in the value of the remaining land. Whether the municipality will accept the offer remains to be seen, but the idea of carrying out such an undertaking by private enterprise is worth keeping in mind. There are many places where street improvements of this kind might be made by private individuals at a profit, and if the tax-payers could through private enterprise be relieved of some of the expense which attends street widenings or extensions, the work of improving our older towns would go on much more rapidly than it does now.

THE *British Architect* calls attention to the fact that the International Copyright Convention, which met recently at Berne, Switzerland, and concluded an arrangement for the protection of the interests of authors and artists throughout the world, included in its list of the kinds of artistic property which it proposed to protect all "plans, sketches and plastic work relative to geography, topography, architecture, or science in general." We believe that the United States was not represented in the Convention, the official view of copyright which is taken in this country being somewhat peculiar, but the International Union, which was permanently established by the Convention, has extended an invitation to us to join with the others whenever we see fit to do so. At first sight an architect's interest in copyright protection abroad seems to be much less than that of an author, but when the new Union, which is well supplied with intelligence and determination, begins to make progress with its work, we are disposed to think that the advantages which it offers to architects will appear of very considerable importance. It is true that there is difficulty in preventing the virtual copying of a design, since variations are generally made in the copy which serve to cast doubt on the technical similarity of the two; but if the Union does what it proposes for the defence of intellectual property, not only designs, but details, relating to construction as well as artistic effect, will be guarded for the owners, who, in this age of universal interchange of ideas, may often, with proper help, find in foreign countries a better reward for their efforts than in their own.

ON the twenty-first of September last a competition took place in France, under the auspices of the Northern Industrial Association, between firemen, the prizes offered being sums of money varying from twenty to fifty dollars, to which were added a silver medal and a diploma. The object of the competition was to encourage men employed in this modest business to try to learn, by practice and study, to do their work well, and the competition was so arranged that all the competitors should gain something in knowledge if not in money. According to the programme, which we find in the *Revue Industrielle*, the competition was to extend over two days. On the first day the men worked under the advice of engineers and inspectors connected with the Industrial Association, and could get all the information that they chose to ask for. On the second day they were left to themselves, to put in practice all the knowledge that they possessed, and the works of this day determined the result of the competition. According to the best mechanical engineers, the economy with which a steam-boiler can be managed depends greatly upon the skill and attention of the fireman, and one who can tell just when his fire needs coal, and can feed it so judiciously as not to check combustion and drive off the best part of his fuel into the air in the form of smoke, may save for his employer a considerable sum every year; and there are few employers who, finding themselves well served in this respect, would not be willing to return to the fireman, in the form of increased wages, a part of the money which his efforts had saved for him.

ANCIENT AND MODERN LIGHT-HOUSES.[1] — III.



THERE is a lofty and ancient tower overlooking the Atlantic Ocean at Corunna, Spain. It is called the Pillar of Hercules, and it is thought that the name Corunna may be a corruption of the word "Columna." By some writers the origin of this tower is attributed to the Carthaginians, by others to Caius Servius Lupus, who dedicated it to Mars. It was restored by Julius Cæsar, and again by Trajan. Its architecture relates to remote antiquity. A tradition states that it was erected by an ancient king of Spain in heroic times; it is now ninety-two feet high. At Ravenna there is a large square tower standing out from the side-walls of the Church of Santa Maria in Porta Fuori, and now used as a campanile or bell-tower: it is supposed to be the pharos of the port constructed by Augustus. In the fifth century this port was so silted up as to be obliterated, and its site was converted into gardens.

The beautiful light-house at Genoa, called Torre del Capo, was originally built on the promontory of San Berrique in 1139, and first lighted in 1326. It was removed in 1512, and re-built by the Republic in 1643. It is a square tower, in two stories, with battlemented terraces, the lower portion nine metres square, the upper seven. Rising from a rock forty-two and one-half metres above the sea, it carries its light at the height of one hundred and eighteen and one-half metres above the water. In 1841 it was fitted with a Fresnel, first-order lens: for beauty and elegance of structure this historic light is one of the finest in existence.

The Pharos of Meloria was built by the Pisans in 1154. It indicated the direction to be taken by ships bound for Porto Pisana, and gave warning of a dangerous sand-bank. This tower was three times destroyed — in 1267 by Charles of Anjou, in 1287 by the Genoese, and in 1290 by the Guelphs. Having determined to abandon Meloria, the Pisans erected, in 1304, the light-house which still exists at Leghorn. It is celebrated by Petrarch. Standing near the entrance of the harbor, to the south of the new mole, it rises forty-seven metres above the level of the sea. It is built of stone, in the form of two battlemented cylinders, surrounded at the base by a polygonal enclosure of thirteen sides.

EDDYSTONE LIGHT-HOUSE.

TO THE KING: —

"I have it not in my power to present YOUR MAJESTY with a fine piece of writing, or of drawing; neither literature, nor the fine arts having been much the objects of my study; but I humbly submit to YOUR MAJESTY, a plain account of the construction of a plain and simple building, that has nevertheless been acknowledged to be, in itself, curious, difficult, and useful; and, as such, I trust, worthy of observation."[2]

Eddystone, the most famous of modern light-houses, built and destroyed so many times, has a history of its own, and though the present structure is not the one built by the famous Smeaton, yet we owe to his genius and strong common sense the design of a tower which has become a type.

Eddystone Rocks, probably so called from the various and conflicting currents running through them, are situated about S. S. W. from the middle of Plymouth Sound, nearly fourteen miles from the town of Plymouth, and ten miles from Ram-Head, the nearest point of land. They are nearly covered at high water, and, being just within the line joining Start and Lizard Points, they must have been very dangerous to vessels coasting up and down the Channel, before they were marked by a light; in fact, many a rich craft, homeward bound from foreign ports, has been lost upon them. From the position of these rocks, near the entrance to the English Channel, they are exposed to the full force of all southwest storms, and what still further augments the force of the waves is the fact that these rocks stretch across the Channel for about six hundred feet, and slope gradually to seaward, so that when the sea is calm elsewhere yet the ground-swell, running up their slope, breaks with great violence; and even when there is only a moderate swell from the southwest, yet, owing to the peculiar shape of the House Rocks, the water flies thirty or forty feet high.

Without going into further detail, it will be seen that the erection of a light-house on this exposed place was an arduous and dangerous undertaking. Yet, in 1696, there having been so many fatal accidents to vessels running on the rocks, there was found a man hardy enough to attempt the task. This was Mr. Henry Winstanley, of Littlebury, in the County of Essex. Mr. Winstanley had a certain turn for mechanics, but his ingenuity ran to the grotesque. At his house in Littlebury there were various amusing and startling contrivances: in one room there was an old slipper carelessly lying on the floor; if you gave it a kick to one side — a most natural thing to do — a ghost would start up before you; if you sat down on a certain conveniently-situated chair — to look at the ghost at your ease, perhaps — you would be immediately clasped by a couple of arms, so strongly and effectually that you would need the assistance of your attendant to release you; should you rest in an arbor in the grounds by the side of a canal to meditate on these marvels, you at once found yourself afloat in the middle of the canal, there to remain until the manager chose to return you to shore.

This bent of Mr. Winstanley's probably accounts for the whimsical structure he erected for light-house purposes. This structure took him four years to erect, the entire work of the first year consisting in drilling twelve holes in the rock and fastening in them twelve large irons. The second year a pillar twelve feet high and fourteen feet in diameter was built. The third year the diameter of the pillar was increased to sixteen feet, and the tower was completed to a height of sixty feet, or to the top of the vane eighty feet, and lighted for the first time the 12th of November, 1698. The fourth year, finding that the sea at times buried the lantern, the thickness of the tower was further increased to twenty-four feet, the tower made solid for a height of twenty feet, the upper part of the building taken down and enlarged, and the height of the tower raised forty feet; yet the sea in storms appeared to fly one hundred feet above the vane, and at times would cover half the side of the house and lantern as if they were under water.

Mr. Winstanley does not state of what material he constructed the base of his tower, but from the appearance of a drawing — said to be made at the rock — it would appear that the material used was stone, and that the joints were protected by iron hoops, to prevent the mortar washing out.

The picture[3] shows the completed tower. With all its whimsicalities and absurdities — its bay-window, derricks, ornamental gim-cracks and mottoes, it was a brave and heroic deed to erect it. Some idea can be formed of the violence of the storms which it withstood, as, after it was finished, it was commonly said that it was possible for a six-oared boat to be lifted up by a wave and driven through the open gallery. Mr. Winstanley believed in its strength, and had the courage of his convictions. In November, 1703, he went to superintend some repairs, and some one expressing fears that the structure was not strong enough, and some day might be overturned, he replied: "I am so very well assured of the strength of my building that I should only wish to be there in the greatest storm that ever blew, that I might see what effect it would have upon the structure."

His wish was gratified. While he was there with his workmen and light-keepers, on the 26th of November, a tremendous storm visited Great Britain, and on the next morning it was found that the light-house had disappeared, with all the people in it. Nothing was ever seen of it except a few of the large irons used for holding it to the rock, and part of an iron chain jammed in a crevice. At the same time that the light-house was destroyed, the model of it, in Mr. Winstanley's house at Littlebury, in Essex, two hundred miles distant, fell down and was broken to pieces. Not long after this accident the *Winchelsea*, a homeward-bound, Virginia man-of-war, was wrecked upon the rocks on which the light-house stood, and most of the crew were drowned.

Though Winstanley proved that it was not impracticable to build a light-house on the Eddystone rocks, and though the light had shown itself to be of great use, yet it was not until the spring of 1706 that an act of Parliament was passed "for the better enabling the Master Wardens and Assistants of Trinity House at Deptford Strand to rebuild the same." The work was commenced the following July. By this act the duties payable by shipping passing the light were vested in the corporation of Trinity House, and they were empowered to contract for its erection. In consequence of these powers, they employed a Capt. Lovel, or Lovet, to build it, giving him in payment the duties for a term of ninety-nine years, commencing from the date the light should first be exhibited and continuing so long as it should be shown.

Captain Lovet engaged Mr. John Rudyerd to be his engineer — an apparently strange choice, as Mr. Rudyerd was a silk mercer, who kept a shop on Ludgate Hill, London.

This choice proved, however, to be a happy one. Mr. Rudyerd avoided the errors of his predecessor; he chose a circle instead of an irregular polygon for the plan of his building and omitted the unwieldy ornaments, the open gallery, the cranes, and other contrivances.

Rudyerd's light-house was a frustum of a cone, twenty-two feet eight inches in diameter at the base and fourteen feet three inches at the top, sixty-seven feet high to the floor of the lantern; the height of the centre of the light was nine feet above the balcony floor, and the total height of the tower from the lowest part of the base to the ball on top of the lantern was seventy feet.

It was built mainly of wood ballasted with stone; this is probably due to the fact that Mr. Rudyerd's associates in the work were Mr. Smith and Mr. Morcut, shipwrights from the King's yard at Woolwich, and further accounts for the structure being more in the nature of ship-joinery than of ordinary carpenter's work.

To prepare the foundation the surface of the rock was first approximately levelled off in steps, in which holes were drilled to receive heavy iron bolts or branches, as they were called, which were in their turn securely fastened to the timbers.

[1] Continued from page 98, No. 557.

[2] Extract from the dedication of John Smeaton's narrative of the building, and description of the construction of the Eddystone Light-house with stone. Second Edition. London, 1793.

[3] See Illustrations.

These holes were made dovetail in shape — two and one-fourth inches wide, seven and one-half broad at top, eight and one-half at bottom and from fifteen to sixteen inches deep, and as they could not all be made alike, each bolt was forged to fit its respective hole; the latter were made four and one-half inches broad at the surface of the rock and six and one half at the bottom; when placed in the hole a space would thus be left three inches wide at the top and two at the bottom in which a key could be driven.

After all the holes were drilled and the bolts and keys fitted, the holes were cleared of water as far as possible and filled with melted tallow; the bolts and keys were then heated to a blue heat and driven home; thus all the interstices would be filled with the tallow; when this was done coarse pewter was melted in a ladle and run in; it of course displaced the tallow, or a greater part of it. This answered so well that fifty years afterward when these bolts were taken out the tallow still remained fresh and the iron not rusted.

These bolts were not placed very regularly, but the plan in general was to arrange them in two concentric circles, one about a foot inside the other; in addition there were two large bolts fixed near the centre, to which was attached the mast.

The lower part of the tower consisted of a solid oak grillage, carried two courses higher than the top of the rock; on top of this were placed five courses, one foot thick, of stone, laid without cement, but held together with iron cramps, then two courses more of solid timber, surrounded with timbers conforming to the contour of the circle, so that when the outside upright timbers were placed the bolts fastening them would not enter the horizontal timbers with the grain; some courses of the lower grillage were arranged in the same way.

The outside of the tower was then formed of upright timbers, bolted to the grillage courses and to each other, and terminated by a planking three inches thick which formed the floor of the lantern. The seams between these uprights were caulked with oakum and payed with pitch.

The tower was perfectly plain except the cornice at the top and a protection at the bottom; the former served to throw off the sea at the top and prevent it from striking the lantern. The latter was probably an afterthought to protect the bases of the uprights from the shock of the waves.

This structure was a great advance on the first one; it stood for forty-six years and was then destroyed not by a storm but by fire.

Three years after it was commenced a light was exhibited from it, and the next year, 1709, it was entirely completed.

Louis the XIV was at war with England during the construction of this light, and once a French privateer captured all the men at work and carried them to France with their tools. The captain quite prided himself on his achievement and expected to be well rewarded, but the king, when he heard of it, clapped the captain and his crew into prison, released the workmen, loaded them with presents and sent them back to their work saying that, though he was at war with England he was not at war with mankind and that the Eddystone light-house was so situated as to be of equal service to all nations navigating the English Channel.

No repairs of any moment were necessary until the year 1723 when it was found that the lower ends of the uprights, especially on the lower side were being eaten by a small worm, possibly the limnoria; they were then thoroughly repaired. In 1744 there was a tremendous storm which tore away thirty of the uprights and made a breach into the store-room, but by great exertion this disaster was repaired before the close of the year.

For many years after the light was established there were but two keepers; this number was ample for its maintenance, but it so happened that one of the men sickened and died, and the other, fearing to throw the body into the sea lest he might be charged with murder, allowed it to remain in the light-house and hoisted a flag, which was the signal that he needed assistance.

The weather was so bad for a whole month that the attending boat could not land, and when they finally succeeded the stench was so noisome that it was with the greatest difficulty that they could dispose of the body by throwing it into the sea, and it was not for long after that the rooms could be rid of the foul odor. After this the proprietors employed three men, to guard against the recurrence of such an accident. This also allowed each one in turn to go on shore for a month during the summer.

The fire which destroyed this light-house, which had withstood the fiercest storms for nigh half a century, took place in December, 1755. The keeper going to snuff the candle at 2 A. M., found the lantern full of smoke, and when he opened the door was driven back by a burst of flame.

The candles were twenty-four in number and weighed two and one-half pounds each; their long continued use must have thoroughly dried the woodwork of the roof of the lantern which besides was probably covered with soot, so that a spark would easily ignite it.

The poor keeper did what he could to put out the fire; he after a while succeeded in awakening the other two keepers and they all tried to throw water on the flames, but as it had to be brought seventy feet high, they soon found their efforts unavailing, and in addition one of the keepers, the one who discovered the fire, was disabled by a curious accident.

While he was looking upwards, endeavoring to see the effect of the water he had thrown, a shower of molten lead fell on his head, neck and shoulders — part of it ran inside his shirt-collar and burned him badly; he also felt an intense burning inside, and supposed that part of the lead had passed down his throat.

The three men gave up the unequal struggle and descended from room to room, as they were driven by the heat and melting metal.

Early in the morning the fire was seen on shore, and a philanthropic gentleman fitted out a fishing boat which arrived at the light-house at 10 A. M. The fire had then been burning eight hours; the light-keepers had been driven from the tower, and to avoid the falling timbers and red-hot bolts, had taken refuge in the hole or cave on the east side of the rocks under the iron ladder, near the landing.

The men were stupefied, and the wind being from the east made a landing extremely hazardous, if not impracticable. They, however, were saved by the crew first anchoring the large boat, then a small boat was rowed toward the rock, paying out a rope which was attached to the large boat; when near enough to the rock a heaving-line was thrown to the men. Each light-keeper in turn fastened the rope around his waist, and jumping into the sea was hauled into the boat.

As the fishing-boat could do nothing to quell the flames it returned to Plymouth to land the keepers; one as soon as he got on shore ran away, it is supposed in a panic; the one burned by the melted lead was sent to his own house for medical attendance; he was ninety-four years old, but remarkably active considering his age. He told the doctor that he had swallowed the molten lead, and that he could not be cured unless it was removed. He lived until the twelfth day, when he suddenly expired—the doctor opened his stomach, and found therein a solid oval piece of lead weighing more than seven ounces. The doctor sent an account of the case to the Royal Society, but that wise body pooh-poohed the whole matter, and doubted the truth of the story. This nettled the good doctor, and to prove that animals might swallow molten lead and still survive, he tried the experiment on dogs and fowls, and found that they did live until he opened them to extract the lead. There is particular mention of one cock, who though dull would eat barley corn, from whose crop was removed a lump of lead weighing three ounces. These experiments seemed to prove the doctor's case pretty effectually, but about all the satisfaction he got was being censured for cruelty to animals.

AN EDITOR'S TRIP ABROAD.[1]—XIV.

FRENCH POLITENESS.—THE ECOLE DE MEDECINE.—THE COLLEGE OF THE SORBONNE.

AFTER five or six weeks of rather rapid travelling through so many different countries, to say nothing of the confused state of mind in which contact with five successive languages in the same space of time naturally leaves the guide and interpreter of a party, it was very pleasant to get back to Paris and to our letters, and we felt, as the train rolled into the Northern Station, a little as if we were returning home. Perhaps the fact of having changed our lodging-place from the Rue de Rivoli to the Boulevards may have made some difference, but it seemed to us that the city had, since we left it, received an extraordinary influx of Americans. Naturally enough, the prevailing language in the hotel was English, at least among the guests; but on the streets in the neighborhood one was pretty sure to overhear English phrases proceeding from at least one in three of the groups standing on the sidewalks, or looking in at the ever-fascinating shop-windows. Even in the churches, the precious Baedeker, which, however, the English and Americans share with the Germans, appeared to be nearly as common as a prayer-book in the hands of the people present, and at the Louvre it seemed to be the indispensable companion of the greater part of those who had no place in the "escorted parties" which followed each other at short intervals through the rooms. As we had chosen to be our own escorts, we had some curiosity to watch the people who were under more experienced guidance, and it is only fair to say that it seemed to us that they were conducted, at least through the Louvre, with exemplary efficiency and economy of time. For the ordinary tourist, turned in among one or two thousand pictures, with only a few hours to see them in, it is practically impossible to select at a glance those which best merit his attention, and even with such a guide as Baedeker it takes many minutes to hunt up on the walls the particular number referred to in the book, and refer back to the book for the next, so that the system of providing guides, especially such painstaking and well-qualified ones as those which usually seemed to conduct the large parties, who point out successively the best of the pictures, remarking upon them while their flock is studying them, has a great deal to commend it, even to persons who know much more about pictures than most of the visitors to the Louvre.

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[1] Continued from page 132, No. 560.

We had nearly finished our sight-seeing, and were called upon to attend to some little affairs, which gave us an opportunity for strengthening the high opinion that we had previously formed of French courtesy and amiability. Perhaps nothing strikes an American abroad so much as the general gentleness and civility of most foreigners, to each other, as well as to strangers, but to me there seemed to be among the French a certain affectionate zeal in their kindness which distinguished them beyond the rest.

Perhaps the untiring and thoughtful politeness with which our own friends provided for our entertainment may have made us more ready to observe a similar disposition in strangers, but we could not fail to notice it wherever we had an opportunity to watch the conduct, not of the waiters in the cafés on the Boulevards, or of that portion of the population which begins to wake up at midnight, but of the real Parisians, the modest, industrious and sensitive people who have for two thousand years made the city in which they live the most attractive place in the world. How severely their patience must be taxed by the eccentricities of the foreigners whom they serve with such sweet smiles, probably they alone could say, but even a summer tourist can observe and admire a good many of the manifestations of their tact and good temper. The worst of their trials would naturally come from the lack of a common medium for the communication of ideas between them and their guests; but it is surprising to see how far a little good-will and quickness of mind will make up for this, especially if the other party shows something of the same qualities. As a rule, Americans in Paris who do not speak French seem to realize that it would be desirable to do so, and with this modest idea in their heads they pick up very rapidly the common words and phrases necessary to make themselves understood, but there are some individuals, either English or Americans, who seem to have arrived at the conviction that it is mere perversity in a servant, or "inferior," to be incapable of understanding them, and that nothing is really necessary but an authoritative tone, and a threatening manner, to terrify the delinquent into submission and comprehension. As we entered the hotel once, in some town in Germany, we heard a loud, fierce voice proceeding from the pantry, and as we passed on our way to the dining-room, perceived that a dialogue, or rather, a monologue, was going on between an English-speaking tourist and the youngest of the waiters, who understood no more of his interlocutor's language than the latter did of his. The waiter was a little man, hardly more than a boy, while the tourist was large, stout, and of that habitually exasperated bearing which seems to be most cultivated in the British Isles. If the little servant had been pinned to the wall by a spear he could hardly have been held there more helplessly than by the terrible eye of the Saxon, who stood close before him, transfixing him with a steady stare, while he repeated, slowly, and very loudly, the list of the things that he wanted for his supper, as if he would drive it by force through the other's skull. At each repetition the wretched waiter grew paler, and looked more helplessly from side to side for a chance to escape, until our coming created a diversion, under cover of which he fled, to send back in his place the head-waiter, who knew what "mutton chops, well done," meant. As Frenchmen usually find it much harder to understand English than a German would, on account of the greater difference between their idioms and those of the Saxon, there would naturally be continual misunderstanding among them, if it were not for their quickness and patience, which makes them perhaps the easiest of all foreigners to get along with for persons who are unable to speak their language.

Being intent, so far as opportunity offered, upon the pursuit of professional inquiry, I was glad to avail myself of the kindness which opened to me the gates of the two most important of the new buildings of Paris, the extension of the Sorbonne and the additions to the École de Médecine. The beautiful façade of the library of the latter, on the Boulevard Saint-Germain, had attracted my attention on my first visit to that quarter, but it was not until later that I discovered what it was, and had a chance to understand and appreciate thoroughly M. Ginain's greatest work, which must certainly place him high among the immortals of French architecture. To begin at the beginning, the French Government, having determined to increase very materially the resources and equipment of its famous medical school, whose renown, once unrivalled in the world, has of late years been perhaps somewhat dimmed by the fame of the clinical lectures at Vienna, entrusted M. Ginain with one of the most difficult and complex pieces of planning ever proposed to an architect, requiring him, not only to utilize the existing buildings, but to add several others, all larger and more spacious than the old ones, but conveniently connected with them. This alone would not be a very easy problem to solve with credit, but to increase the designer's perplexities, he was obliged to adapt his plan to a piece of ground not only irregular and awkward in outline, but so uneven in surface that the first floor in some portions of the group of buildings corresponds with the second floor in the adjoining portions. The most important members of the new group were to be the medical library, and two or three large clinic buildings, and of these M. Ginain chose the library to form his main front, making it very long and very narrow, with windows only on the street, and by that means not only getting a good light and plenty of shelf-room, but saving space for his other buildings, at the same time extending this one sufficiently to take up practically all the Boulevard front of the lot, and to give him a most imposing façade, unbroken by any such change of motive as a French architect's principles would require of him if he had divided the frontage between two of the components of his plan. So far as the Neo-Grec implies simplicity of form, with exquisitely studied and unobtrusive ornament, M. Ginain's work may certainly be described as being in that style. To my mind, the only modern building of importance in Paris that approaches it for the architectural perfection, apart from the merit, as sculpture, of the detail, is that greatest of Neo-Grec buildings, the Bibliothèque Sainte-Géneviève; but beautiful as Labrouste's master-piece is, the Ecole de Médecine much surpasses it in effectiveness, attracting the eye from a long distance by its striking but simple outline, and the majesty of the great Ionic colonnade which marks the middle portion. Inside, the library is as simple as such a room could well be. Between the three-quarter shafts of the colonnade open long and high windows, which give an admirable light, sufficient not only for the opposite wall, which is to be entirely occupied by books, but for the spaces beneath the windows themselves, which also afford room for shelves to a height of about eight feet above the floor. The roof, with true French simplicity, is framed with nearly equilateral trusses, presenting a flat, plastered ceiling inside, slightly decorated in relief, and a long roof outside, perfectly straight and unpretending, but of the happiest proportion and effect.

The new buildings for the College of the Sorbonne, aside from their importance as forming a part of the means by which the French Government proposes to raise the Sorbonne into what might be called the great democratic university of the world, had a special interest from being the first important executed work of a young architect, M. Nénot, whose previous successes, as winner of the Prize of Rome, as the author of a remarkable series of restorations of the sacred enclosure at Delos, and finally, as the laureate in the great competition for the Victor Emmanuel monument, had fixed the eyes of the professional world upon him. It would be tiresome to go into the particulars of M. Nénot's plan, which has been repeatedly published, together with those of his rivals in the competition which ended in his selection as architect, and it is enough to say that the portion of the building now in process of construction comprises a vast theatre for the awarding of prizes and degrees, preceded by a vestibule and public entrance of suitable proportions, and flanked on either side by masses of building intended for division into lecture rooms and laboratories, which enclose, between themselves and the great theatre-building, two pretty and exactly similar courts. As the construction had nowhere advanced to the cornice, and the "*ravalement*" had barely begun, I was unable to judge of the probable appearance of the building, but the planning and arrangement were full of interest. Although the walls were not built even high enough to receive the roof, except in one place on the court, the heating-apparatus for the great hall was in place. I knew well enough that heating by steam is less popular on the other side of the Atlantic than with us, but even that did not prevent me from being a little surprised to find preparations made for warming the whole of the immense "Salle des Récompenses," with its appendages, by hot-air furnaces. As in Trinity Church, Boston, and perhaps in other American buildings, M. Nénot had provided for converting the whole of the basement beneath his principal room into a warm-air chamber, with openings through the floor at suitable points. As there would naturally be many points where in winter a supply of warm air would be desirable in the great hall, there were many openings, but I saw no indication of the way in which it was intended to solve what our engineers would perhaps consider the most difficult point in the problem, the equalization of the flow of warm air through them. Many, if not all the furnaces for heating the air were in place, showing the usual brick and iron fronts, with wings for the smoke-pipes, or other radiating members, and one hot-air duct, apparently leading to another room, had been constructed, of iron beams and bars filled in with terra-cotta or plaster blocks; but there was nothing, so far as I could see, to show that a fan was to be put in, or that any means except the natural buoyancy of the heated air would be depended upon to carry it where it was wanted. Fortunately, the climate of Paris is mild in comparison with ours, and it is altogether likely that M. Nénot's plan for warming his great hall, as well as that of M. Ginain for supplying cold fresh air to his library by means of grated openings directly through the front wall, will answer admirably in practice; but they are rather startling so those who have to deal habitually with a winter atmosphere in which mercury nearly or quite freezes. For the rest, M. Nénot's building seemed thoroughly well thought-out and solid in construction. The sub-structure, particularly, was noticeable for the amount of what was practically concrete work of the Roman sort. Not only the vaulting to support the floor above, but many of the larger piers, were built of the roughest kind of rubble, composed of small pieces of "*meulière*," or mill-stone grit, buried in cement mortar. There was hardly any attempt at bond in the piers, and none at all in the vaulting; but the "*meulière*," which resembled in roughness the conglomerate stone employed for certain purposes about Boston, evidently held so firmly to the hard cement in which it was embedded as to form a mass quite as suitable for its purpose, perhaps, as a construction of cut stone, and far cheaper, and bold as the innovation seemed to one brought up with due reverence for headers, through-stones and stretchers, I could not help thinking that M. Nénot had offered a suggestion which, in these days of Portland cement, ought not to be lost sight of.

THE ILLUSTRATIONS

Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

INTERIOR OF A MOSQUE AT TLEMCEN, AFRICA.

[Gelatine print issued only with the Imperial and Gelatine editions.]

COMPETITIVE DESIGN FOR THE LIBRARY AND MUSEUM, MINNEAPOLIS, MINN. MR. H. L. WARREN, ARCHITECT, BOSTON, MASS.

PARIS VIEWS, AFTER ETCHINGS BY FRANCOIS MAXIME LALANNE.

BROOKLYN LIFE INSURANCE COMPANY'S BUILDING, LIBERTY ST., NEW YORK, N. Y. MR. F. CARLES MERRY, ARCHITECT, NEW YORK, N. Y.

WINSTANLEY'S LIGHT-HOUSE ON EDDYSTONE ROCK.

RUDYERD'S LIGHT-HOUSE ON EDDYSTONE ROCK.

For description see article on "Ancient and Modern Light-houses" elsewhere in this issue.

MÜNTZ'S RAPHAEL.[1]—II.

RICHLY endowed by nature, and well stored with all the precepts of the contemplative and elegiac Umbrian School, Raphael felt that the complement of his education, the virile and grandiose qualities, were only to be acquired in midst of the intenser life of Florence, then the artistic centre of Christendom. She supplied the pope, the Italian princes, the kings of Spain, Naples, France, England, and even the sovereigns of Muscovy, Hungary, and Turkey with architects, painters, sculptors, goldsmiths, miniaturists, and medalists. Nowhere was art honored and the artist fostered as in this free town. The painter and the sculptor were the peers of the aristocracy. The government treated with Michael Angelo as power with power. Artistic competitions fermented the whole city. "In contrasting the standing of the leaders of Florentine art with that of their *confrères* of Perugia, Siena, or Urbino, one is tempted to repeat the exclamation Durer let slip — all surprised by the honors paid him at Venice in 1506 — 'Here I am a gentleman; at home a parasite.'" Raphael came to Florence with no flourish of trumpets, for his reputation was but provincial, and he was doubtless chiefly known as the cleverest and most promising pupil of Perugino, whose reputation in Florence, where he had worked with honor and profit, was now decidedly on the wane. Nevertheless, the presence of the master during the pupil's sojourn there, if only temporary, must have proved invaluable, since the former's influence and popularity with both native and foreign patrons who frequented his atelier was still considerable. Raphael quitted his native Urbino in 1504, armed with a letter of recommendation from his protectress, the Duchess Giovanna della Rovere, to the "gonfaloniere" Pietro Soderini (who never seems to have patronized him). This flattering letter runs: "The bearer of the accompanying is Raphael of Urbino. The talent with which he is gifted has decided him to settle in Florence for some time in order to perfect himself in his art. His father was dear to me on account of his excellent qualities. I have no less affection for the son, who is a modest and amiable young man, and I wish him to make as much progress as possible. I therefore recommend him with particular urgency to your Lordship, begging you to assist and favor him as much as you can in every circumstance. Whatever services your Lordship may render him, I shall deem rendered to myself, and I shall be under the greatest obligation to you." This letter, though flattering, as before observed, indirectly but very clearly reveals Raphael's status at the time — that of a gifted young man from the provinces who has still much to learn in "the metropolis" before he can rank with the greatest.

Some years before Raphael's advent, the famous "Casino" of the magnificent Lorenzo, rich in antique marbles, bronzes, and intaglios — the school of Michael Angelo — was swept away in a day's rioting. Fortunately, there were pious hands to gather the waifs from this ghastly shipwreck. Lorenzo's brother-in-law, the historian Bernard Rucellai — not to mention others — especially busied himself in preserving the antiques collected by the Medici, as well as in making new acquisitions, till his gardens, the "Orti Oricellari," could vie with Lorenzo's "Casino," and offered the artists of the day those models in default of which the progress of the Renaissance would assuredly have been checked. As compared with the more marked influence exercised by classic art on Raphael in later years at Rome, the traces of antiquity discoverable in the work of his Florentine period seem faint enough; but it must be remembered that the early Renaissance never absorbed antiquity bodily as in later times. It profited by its lessons, and was more or less inspired by it, but the spirit and style were clearly vernacular. Architects, painters, and sculptors were ever seeking to ferret out the principles that guided their glorious predecessors of Athens and Rome, but they were never servile imitators. Men of the Donatello stamp were too ardently naturalistic to follow resignedly in the traces of any predecessor, however illustrious. It was only at the beginning of the sixteenth century that the imitation of classic models was held to be one of the canons of sculpture. In painting, the triumph of antiquity was retarded, seeing that it was no easy matter for a graphic to assimilate the principles of a plastic art. The school of Padua was the first completely to overcome these difficulties, perhaps too completely, for even its immortal coryphæus, Mantegna (1431–1506), seems to have been hampered at times by classic reminiscences. At Florence the struggle lasted longer. Botticelli's (1447–1518) "Venus," for example, "long, thin, ill-balanced," is anything but classic; yet there is a "fragrance of youth and poetry" about her difficult to find in the more correct and scholarly work of a Giulio Romano (1492?–1546). It is almost impossible to discover any *souvenirs* of antiquity in the paintings of Leonardo, nor does he mention it as an educational means in the "*Trattato.*" But Leonardo was altogether an exceptional character. Michael Angelo got a great deal out of the antique, and Raphael followed the sage example of the Florentine school in this respect, as the "Three Graces" or the "Apollo and Marsyas" testify. Besides the antique, other and not less important agencies were moulding the character and artistic development of Raphael. There was Giotto, founder of the Florentine school, who was named with respect even in high Renaissance days, the sculptors Ghiberti and Donatello, the architect Brunelleschi, the innovator Masaccio, whose "Carmine" frescoes he copied as a matter of course, and last but not least of other illustrious dead, Domenico Ghirlandajo (1449–1494). His beautiful frescoes in Santa Maria Novella are echoed in Raphael's, painted on the walls of San Severo at Perugia.

Of contemporary artists he who unquestionably gained at this time the greatest ascendency over the supple and receptive mind of Raphael was Leonardo, the first intellect of his time, if not of all times. Michael Angelo left his mark there too, but his influence was more strongly felt at a later date. The familiar story of the famous competition between Leonardo and Michael Angelo for the decoration of the Sala del Consiglio is always inspiring, for the effect of these two epoch-making cartoons must have been stupendous. Vasari tells us that Raphael was astounded at the sight of Leonardo's pictures, whose figures are so replete with grace and movement, and studied them in preference to all others. "Little by little and with great pains he abandoned the manner of Perugino, and imitated as much as possible

[1] "*Raphael, sa vie, son œuvre, et son temps,*" par Eugène Müntz, Paris. Librarie Hachette & Cie., 1886. Continued from page 121, No. 559.

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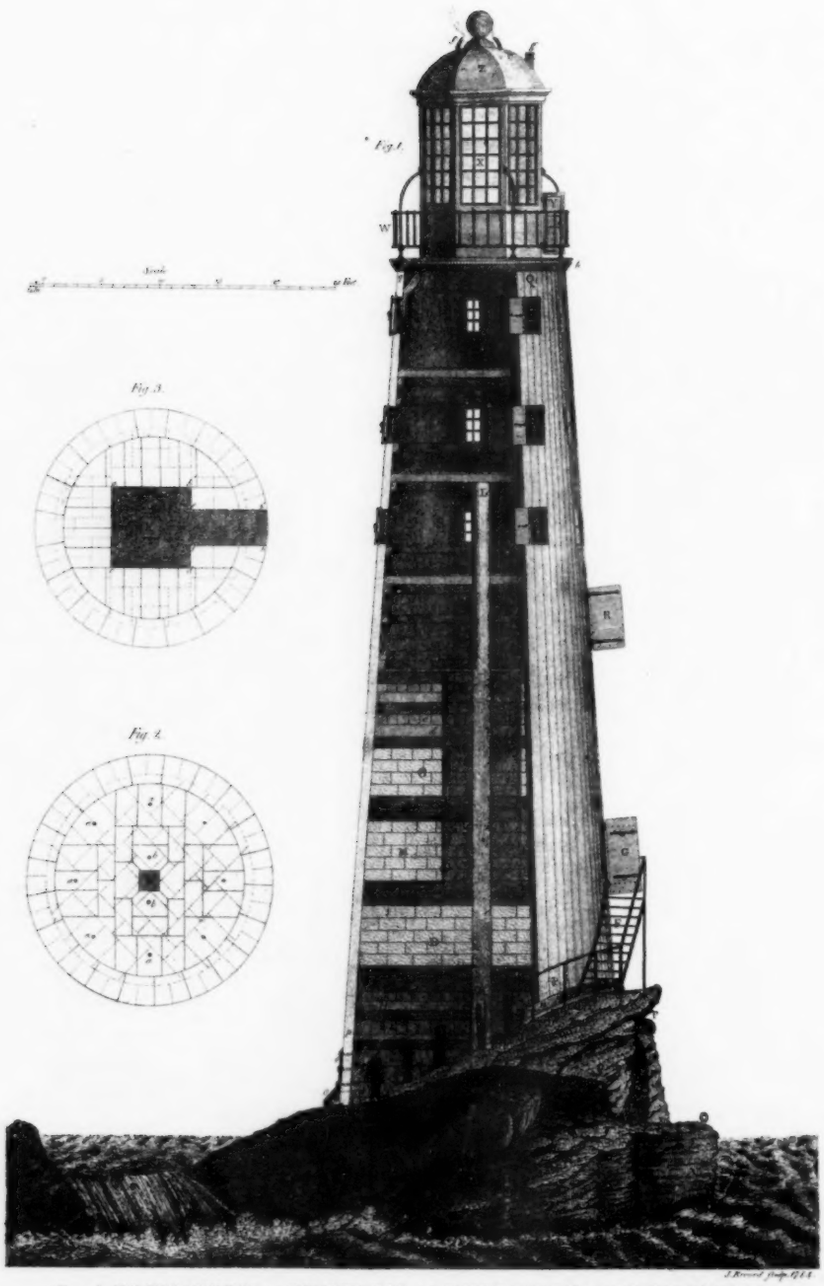

South ELEVATION & SECTION *of* RUDYERD's LIGHTHOUSE,

Completed in 1709, represented as it stood previous to its demolition by Fire, in the Year 1755.

HELIOTYPE PRINT. BOSTON.

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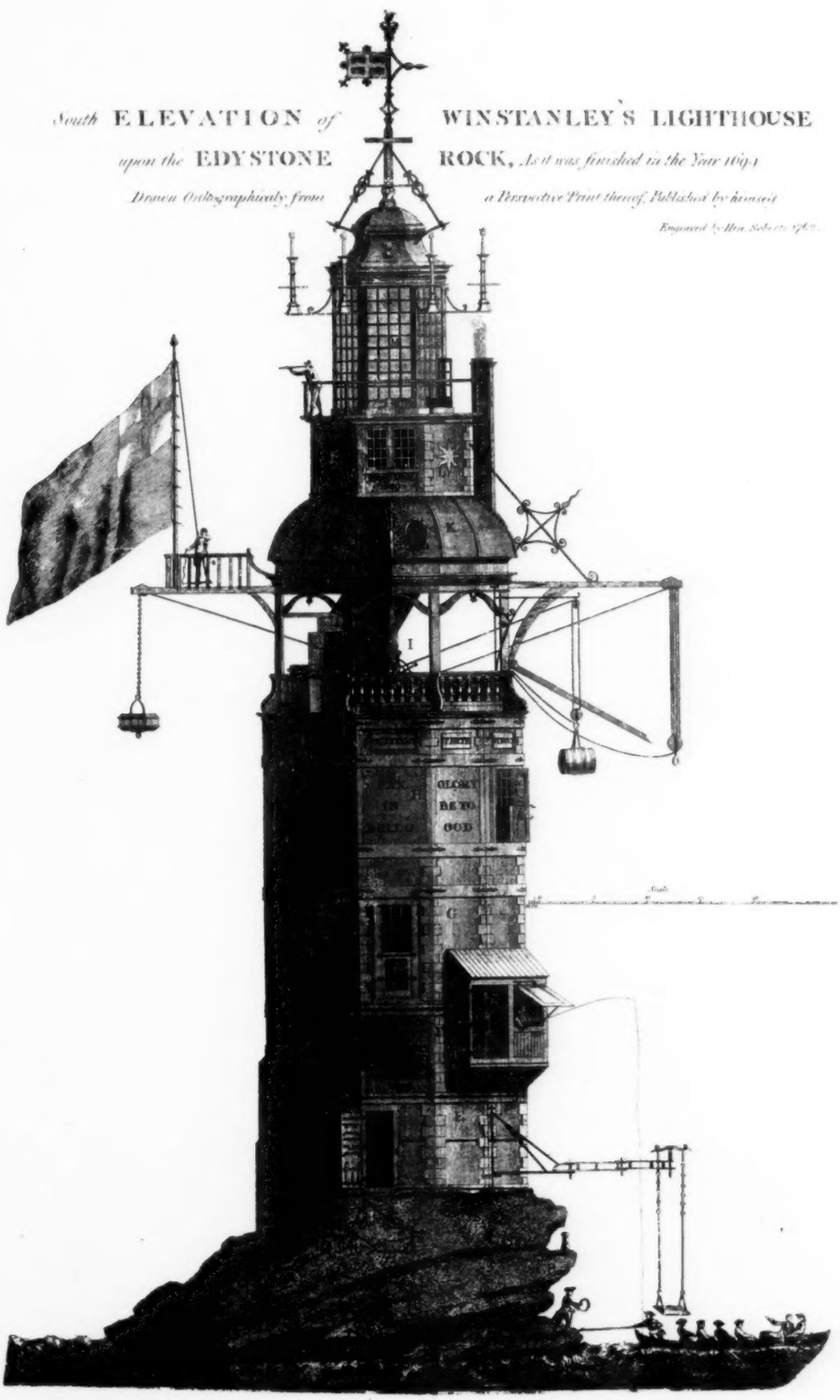
South ELEVATION of WINSTANLEY'S LIGHTHOUSE
upon the EDYSTONE ROCK, As it was finished in the Year 1699
Drawn Orthographically from a Perspective Print thereof, Published by himself
Engraved by Hen. Sebastr. 1700.
GLORY BE TO GOD

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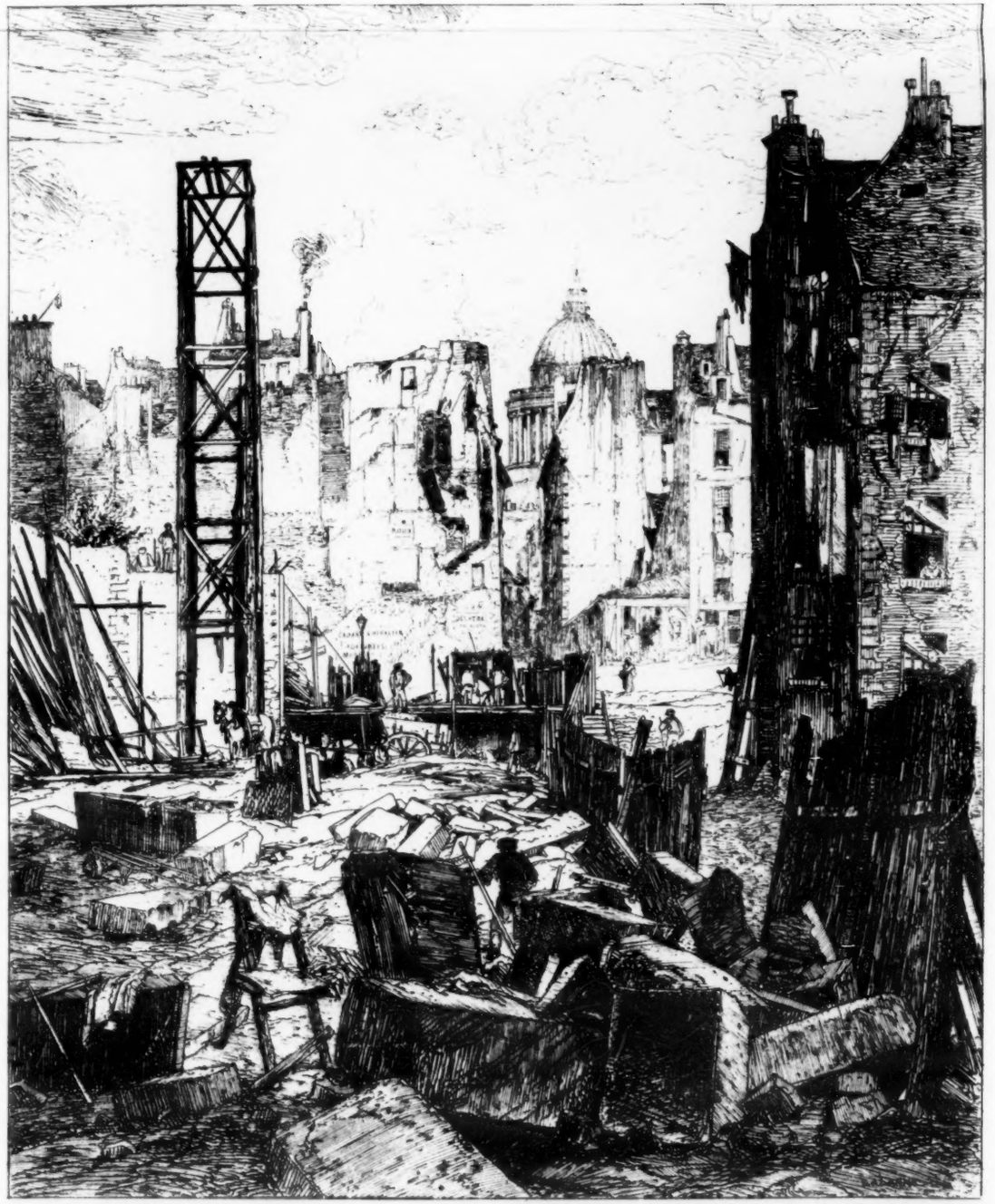
VUE PRISE DU PONT St MICHEL.

CUSSET
(Environs de Vichy.)

RUE DES MARMOUSETS (Vieux Paris)



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DÉMOLITIONS POUR LE PERCEMENT DU BOULEVARD St GERMAIN.
(Vieux Paris.)

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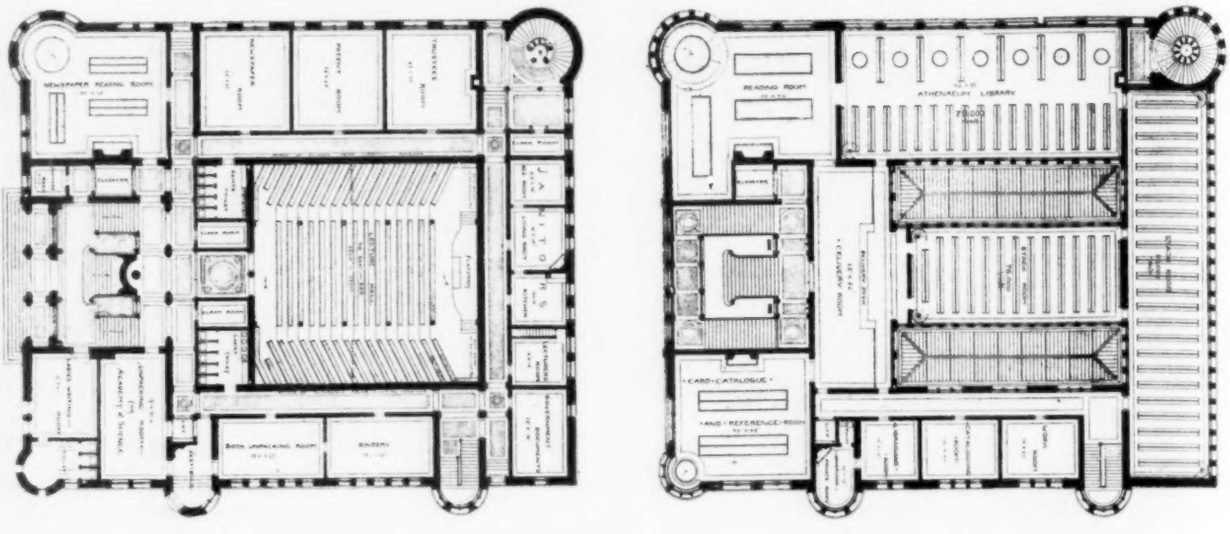

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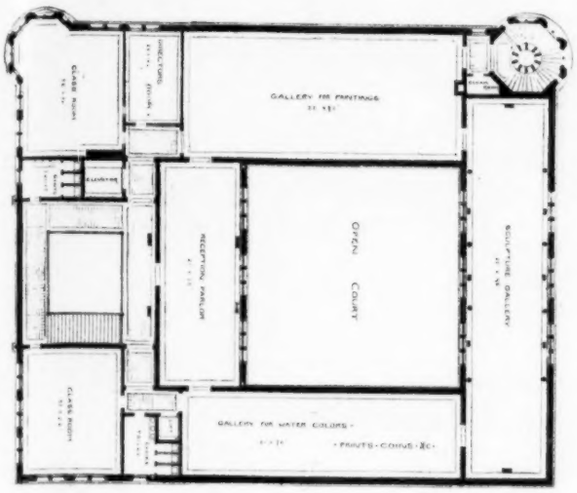
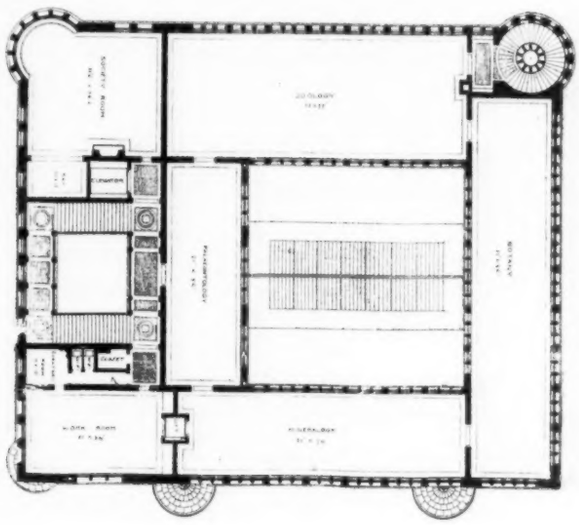
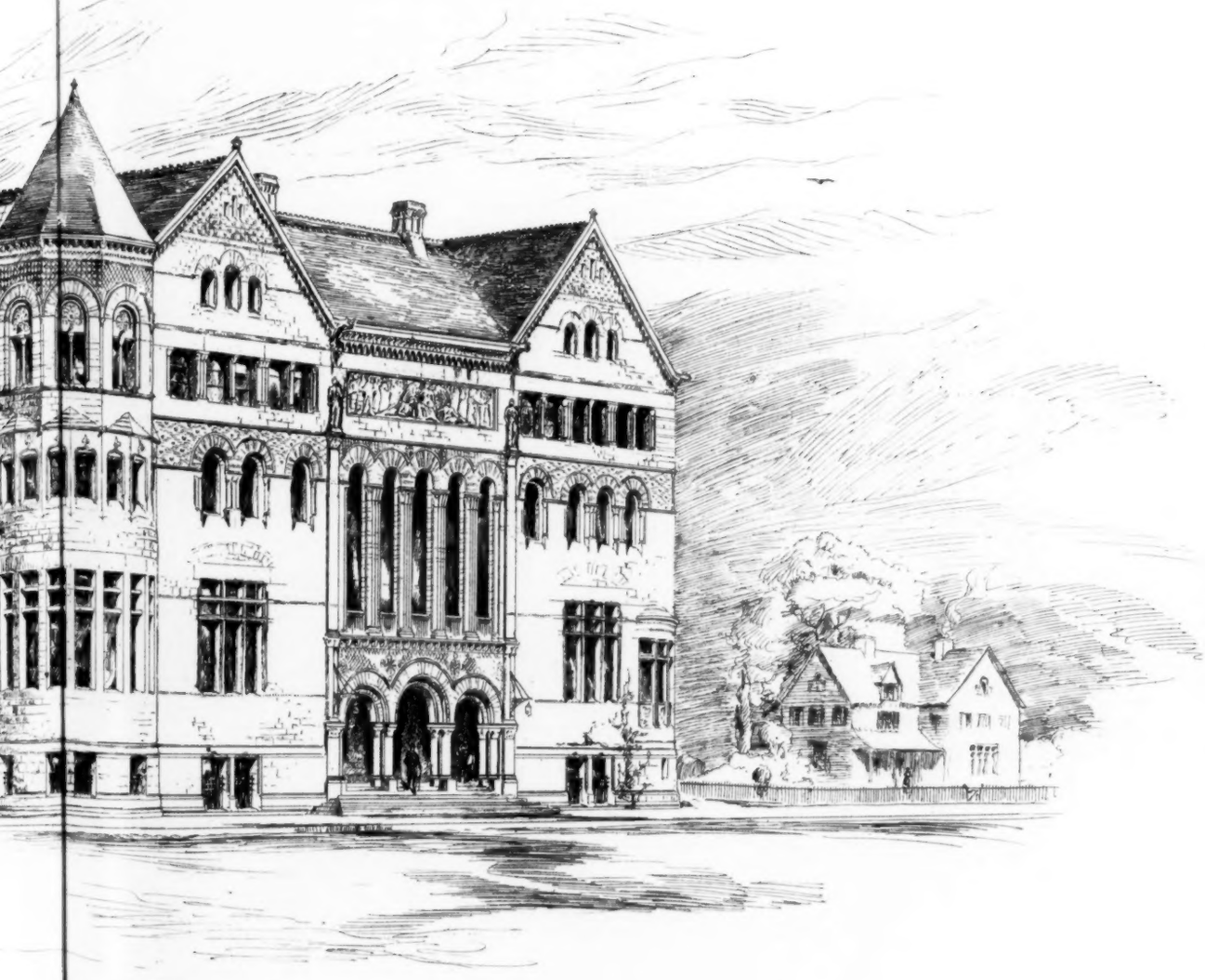






COMPETITION DESIGN FOR LIBRARY AND MUSEUM BUILDING. MINNEAPOLIS, MINN.

Heliotype Printing Co. Boston.

that of Vinci; but in spite of his efforts and application he could never surpass him in some difficulties. If, as is generally thought, Raphael excelled him in softness, and in a certain natural facility, on the other hand he is in nowise superior to him either in the art of invention or expression, wherein few artists have raised themselves to the height of Leonardo. All that can be said is that Raphael is the one that came nearest to him, particularly by the charm of his coloring." Referring to the comparative effects of the influence exercised on the young painter by Leonardo and Buonarotti, M. Müntz writes: "But if the germs lodged in his mind by the author of the "*Cenacolo*" and "*La Gioconda*" were to fructify, thanks to the intimate sympathy between these two choice natures, the imitation of the painter of the Sistine Chapel was fatal. Raphael sacrificed some of his natural qualities, without succeeding in assimilating those of his rival: he exhausted himself in sterile efforts."

Let me remark here, *en passant*, that Michael Angelo is not to be imitated. A whole generation of artists that came immediately after him was tainted by endeavoring to appropriate qualities that are inalienable from their possessor. This sublime artist — perhaps the sublimest that ever lived — was a genius entirely *sui generis*. His work was very strongly impressed with his own personality, and his development was of a one-sided character. If I may be permitted to apply a most informal appellation to so heroic a personage, Michael Angelo was not a good "all-round" artist. Men like Phidias, Da Vinci and Raphael were, and are, therefore, safer models. Michael Angelo certainly conveys his lessons; but he is not to be followed. Raphael made a half-hearted effort to imitate some of the versatile Leonardo's caricatures, or, rather, character studies, but he soon abandoned the attempt; for these phrenological abnormities were contradictory to his nature, enamored only of the beautiful.

After Leonardo, the artist who held the highest place in Raphael's esteem was Fra Bartolommeo della Porta, the champion of Savanarola, and the *résumé* of Florentine art from Giotto to Da Vinci and Buonarotti. The influence of these two painters was reciprocal; each had something to say that the other had never heard. Their intimacy lasted almost as long as they themselves, for the dominican, like Raphael, died young. Crowe and Cavalcaselle suppose with much probability, that despairing to establish anything like intimate relations with either Leonardo or Michael Angelo, Raphael sought the society and instruction of the painter-monk, then somewhat neglected. It was fortunate that on his arrival at Florence he could meet as equals masters who had already made their mark, instead of being forced to mix with the crowd of turbulent young fellows who filled the ateliers—and almost from time immemorial the young Florentine artist had been very turbulent, in strong contrast to his quiet, timid and almost monastic *confrère* of Perugia and the provincial towns. "The gay and bright Raphael could not take offence at their pranks, so new to him; but it is more than credible that the elevation of his character led him rather to seek the society of cultivated and distinguished men—men who resembled that ideal of the perfect 'courtier,' with which he had grown familiar during his residence at Urbino." Very attractive is the picture of the young painter from Urbino, taking his part in the informal but celebrated discussions carried on by notabilities in the studio of Baccio d'Agnolo, architect and sculptor of wood. Among clusters of lesser lights were such luminaries as Andrea Sansovino, Cronaca, Antonio and Giuliano San Gallo, Granaccio and Michael Angelo, "sombre, taciturn, bilious, who only broke the silence to fling some sarcasm. Still, he was listened to respectfully, for though he was scarcely thirty, all Italy was full of his glory." On the other hand, Raphael was not yet a star of the first magnitude. During his four years' sojourn at Florence he only worked for amateurs of the second order. He received no commission for important monumental compositions. Civic corporations and religious communities patronized indigenous artists. The young stranger could only rely on those amateurs who from taste or economy preferred the easel picture to mural paintings. This circumstance, entirely fortuitous, controlled in a measure the nature of his productions. Chance frequently changes the direction of a whole school. These four years were more fruitful to him in lessons, in technical progress, than in material success. He rose rapidly to the rank of master, before the rich amateurs, the Rucellai, the Strozzi and others, were apparently aware of his existence. In vain we seek his praise in the literature of the Tuscan humanists, who lavish their titles of Zeuxis and Apelles on third-class painters. Nevertheless, Raphael was incalculably indebted to Florence. Without her solid instructions he never would have been the incomparable draughtsman, worthy to work for Julius II, for Leo X, and to found the Roman school.

It is not my intention to enumerate the list of pictures, chiefly madonnas, painted by Raphael during his long residence at Florence, and shorter stay at Urbino and Perugia prior to his departure for Rome in 1508. It has been, and will be, my purpose rather to note the causal agencies that specialized his talent, and made him Raphael. His madonnas of the Florentine period, the sweetest, purest, most graciously-beautiful compositions in their way that were ever conceived, form an absolutely distinct group in the work of the young master, who seeks therein to reconcile beauty with truth. Maternal tenderness, infantile joy, and a certain ineffable loveliness — the loveliness of domestic innocence — are expressed with such wonderful eloquence, that they render one oblivious of the dogmatic side of the subject. It seems as though the Divinity had left his exalted, mystic spheres, and descended to the earth, that he might idealize and hallow by his presence the calm delights of domesticity. Occasionally the consecrated attributes of Virgin, Child, or infant St. John are omitted; but they are never emphasized. A faint and linear nimbus alone symbolizes their divine nature. Constrained neither by the scruples of Umbrian patrons, nor by the demands of a pontifical court, Raphael gave free scope to his aspirations. He emancipated himself from all theological tradition—or rather he was one of a series of innovators. It would almost seem that he was an advocate for the "art for art's sake" theory. However this may be, his conscience would have revolted at the idea of sacrificing his art to confessional exigencies. He asked neither for rich stuffs, nor choirs of angels, nor sumptuous architectural framings, nor lustrous grounds of gold. Nature offered him material enough, the blue sky, flower-bedecked fields, placid streams, picturesque towns, and broken mountain lines. He was content to celebrate the beauties of nature — not as a tasteless naturalist, be it understood — to proclaim the grandeur of creation, and to glorify the purest sentiments, maternal and filial love. Surely may not such an art be properly called *religious?*

From the very inception of Christianity, and through all Christendom for many centuries, art had been the handmaid and adjunct of religion. In some communities, such as Mt. Athos, it is still so. As M. Taine observes, mere form did not suffice for the Middle Ages; it must represent some symbol, must designate some august mystery. All was pre-arranged: every detail had its familiar signification, even to the ignorant. The artist lost his independence, but was indemnified by popular sympathy. The Florentine naturalists of the fifteenth century were the first to demolish these venerable traditions. What could the resistance of an Angelico, or of the Umbrian school, avail against these strenuous pioneers, backed as they were by nature and the antique? Portraits supplanted the consecrated types of saints and apostles, and even their symbols were enforced to conform to artistic necessities.

Twice or thrice Raphael was tempted to sacrifice truth to dramatic fervor, as the Bolognesi sacrificed it in later years. He was not slow, however, to discover this temporary aberration, and rectify his course. His genius, healthy and robust, like that of the first Renaissance, abhorred an unnatural abstraction. According to his ideas, a figure should act logically, and conformably to its age, sex and character. "Therefore," says M. Müntz, "his children are always real children; swayed at times by a single sentiment, love for their mother, an ingenuous affection; but this sentiment is always in accord with those of childhood; is never artificial, never theatrical; nor does it ever weary us. This, if I am not mistaken, is the secret of the fascination that Sanzio's Florentine madonnas have exercised for more than three centuries; the secret of their eternal youth."

I do not fancy that M. Müntz would have us believe that Raphael made his studies from life without a *parti pris*. While it is undeniably true that these studies, as well as his finished figures, are remarkably free from false abstractions, especially when compared with those of his mediæval predecessors or academic successors, while it is patent that they live the life that is peculiar to them, never contravening the laws of nature; on the other hand they declare in every limb and movement pre-conceived ideas of elegance and grace. It would never have occurred to him to copy accidental, choiceless nature as do the men of to-day. Thus it is that his children, though replete with life, love, and truth of movement, are yet distinctly creations, undeniably the most beautiful, dignified, monumental types of childhood ever imagined; utterly different in their nobility from the pretty babies of modern holy families. There is nothing that I can think of since the days of Pericles that is more Greek either in feeling or method, though totally unlike in visible expression, than these Florentine madonna compositions of Raphael. They have that "easy, and frank nobility," that "noble naïveté and placid grandeur," the unequivocal characteristic of the marbles of the Parthenon, or the "Hermes" of Olympia. In these immortal works, abstract to a certain point, as ever art must needs be, nothing transgresses the laws of nature; but they represent a sublimated, not a hap-hazard nature. The painted figures of Raphael, like the statues of Phidias are sober, contained, and in a way sculpturesque, though not disagreeably and illogically so, as for instance the pictures of David and his school. M. Taine in a very just analysis observes that they *pose*. Yes, they do pose, yet neither affectedly as Perugino's heroes in the Cambio, nor as the Barocco contortionists, but simply, beautifully, naturally, as an Olympic athlete.

Apropos of Raphael's drawings it is worthy of observation that there are none to be found corresponding, either in method or interpretation, to the modern life-drawing, which is, in reality, rather a painting in black-and-white than a drawing, in the strict sense of the word. There are innumerable suggestions from life in sanguine, pen-and-ink, or silver-point, many tentative and final sketches for frescoes or pictures, drawings more or less elaborate from the nude and draped figures, detail-studies of hands, feet and heads, but all treated subjectively — so, at least, it appears to me — that is with a voluntary, yet discrete, accentuation of the anatomy of the human form, with a due regard for the ulterior purpose of the study, and with a profound respect for style and elegance. It would be both pleasurable and profitable to study comparatively Sanzio's methods of drawing from life, as well as his picture-making processes, and our own; but my space-limit forbids.

There are those who blame Raphael for his constant repetition of trite subjects. "But such criticisms cannot bear examination, for it is easier to vary the subject than to vary the composition. To draw

from a single idea all the developments of which it is susceptible, that is the difficulty. Thus, to limit the programme, moreover, is to offer artists the opportunity of greater improvement. If the progress of the arts, either in ancient or modern times, is considered, it will be discovered that perfection has only been attained by the labor of whole generations testing their strength on a predetermined subject. The necessity of struggling in a circumscribed field, of directly attacking the difficulty, develops in every master resources unbeknown even to himself, and incites him to attempt a supreme effort." Raphael's problem was to make fresh combinations with two or three well-defined figures, the Virgin and the infant Jesus, and often, also, the infant St. John, or St. Joseph. To these were occasionally added others. Long before his time Giotto and Angelico had painted madonnas; but their forte was not the isolated figure. The former required vast wall-spaces on which to indite his epics; the latter accessory choruses of winged angels, adoring throngs of the blessed, or costly gold and ultramarine to perfect his conceptions of the divine personages. The Florentines of the latter half of the fifteenth century made great efforts to harmonize this simple subject — the madonna and child — with the new ideas. They suppressed all unnecessary accessories, and focused the interest on the principal personages, frequently giving the composition the form of a medallion. Nor should the contributions of the Venetians to the subject be ignored. About 1503 Michael Angelo painted his famous circular "Holy Family," a composition that manifested considerable progress. But notwithstanding this and the prodigious success of other valiant men, Raphael played freely and freshly with the same theme, imbuing it with a purity, grace, and classic beauty hitherto unimaginable.

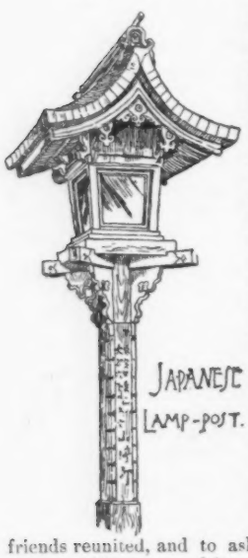
Before closing the chapter of Raphael's Florentine epoch, mention must be made of his first monumental work in fresco (1505), on the walls of San Severo in Perugia. Though the upper portion, by Raphael, is complete in itself, the lower part, left unfinished, owing to press of work, was completed in 1521 by the still-surviving Perugino, just after the pupil's death. Mention must also be made of the "Entombment" in the Borghese gallery — not that the picture is particularly sympathetic, but because it made a profound impression at the time, and marks a turning-point in his career. For the first time Raphael seems to have been desirous of emulating Michael Angelo, of showing his knowledge of the human body, and of solving the most complicated anatomical problems. According to Vasari, "he compared the muscular system of the *écorché* with that of the living model, and studied the diverse effects of its mechanism both on the separate parts and on the *ensemble* of the human body. He examined attentively, too, the articulations of the bones, the attachments of the tendons, and the network of the veins."

It is interesting to note the evolution of the "Entombment," the various preliminary and tentative sketches (one or two of the rejected ones are very beautiful in sentiment and linear arrangement), and his final adoption of Mantegna's scheme. But in spite of these excessive pains — and perhaps because of them — the picture leaves one cold. Such subjects as the scenes from the Passion were too antagonistic to Raphael's natural inclinations to be treated by him with entire success. His genius was too pure, too ideal, too Greek. Could he have invariably chosen his own subjects he would have banished from the domain of his art the expression of suffering.

Frederic Crowninshield.

[To be continued.]

FIRE-INSURANCE AND ARCHITECTURE.[1]



Since the science of insurance is of recent origin, it would not be reasonable to expect that its development would have adequately covered all possible relationships. The extent to which these various adjustments have been already made is a source of wonder to every student of the subject, and at the same time a tribute to the energy and far-sightedness of the underwriters. But along the continually widening circle of your influence new problems present themselves, to whose perfect solution even your ability, if unassisted, is not fully equal. Among these none is of greater importance than the relation between architecture and fire-insurance. In one sense the relationship is of long standing. Alas that it has been so nearly a *status quo* of armed neutrality. To an architect the confession is humiliating but true, that we have certainly contributed our share to this estrangement, and as an architect I propose in this paper to make a straight confession, as is always best between estranged friends reunited, and to ask absolution. For if the relationship between architecture and insurance is to be perfectly understood and adjusted, it can be so only by concerted action between architects and underwriters.

The man who first drank the toast, "Here's to fires," may have been a witty toast-master, but there was something in the toast which suggested in an occult way that he was a witless architect — a hydrophobist with an even unusual hatred of water. He was a sort of Texas Flanigan in a late Republican convention. He was a kind of quickly-applied and swiftly-acting poultice, which draws out of us humors whose existence in the body of the profession we had scarcely suspected.

"Here's to fires" was a hilarious cow-boy whoop, which, like most cow-boyisms, grew out of a complex social drama in which the three villains were the house-owner, the house-builder and the architect. Of these three villains the architect was at once the most harmful and the most to be pitied. As always happens in new countries, it has been true that in America the services of an architect have until within a few years been largely regarded as a kind of luxury; and that his duty was of a purely decorative kind. As for the essential elements of most buildings, the builder was quite sufficient. But a question of rivalry with neighbors, a gratification of personal vanity, a yielding to the whim of wife or æsthetically-educated daughter, or some one else of the "women-folks" — these made necessary the otherwise unnecessary architect. It devolved upon him, therefore, to make a mere skin for interior parts furnished by the house-builder and owner. This epidermis was to be as "tasty" as the architect could evolve out of his inner consciousness, without extra expense to the owner; and, broadly speaking, "tastiness" was regarded as a merely feminine quality, any concession to which was a sacrifice of personal dignity rather inconsistent with a true American citizen. The architect, being held in this slight esteem, naturally took but slight interest in any but the æsthetic part of the building, and since but little money could be spared for this, it became necessary, for the proper advertisement of himself, and the even poetical execution of his design, to have recourse to all sorts of cheap material — wood, jig-sawed and otherwise, and that vilest of all vehicles of architectural expression, galvanized-iron. Thus questions intimately interwoven with the structure of the building fell into a secondary place in the architect's mind.

The slightness of service demanded from him, the smallness and uncertainty of his commissions, frequently drove him, for bread-and-butter reason, to unite the trade of architect and builder. This was the worst phase of the profession; for here not only was the architect for his own credit intent on making as much display as possible, but in this relation he had to deal with a contractor ready to make all posssible concessions to him, since each concession of solider construction was money in the pocket of the firm. Thus, from whatever point the question was viewed, the insurance companies were the sufferers, as all interests united against them. The owner was bent on ten per cent; the builder on more; the architect on great architectural creations rivalling those of Angelo or Delorme, but, for money reasons, in "American" and most inflammable material.

From this point of Arcadian simplicity great strides have been made. It may now be truly said that the better class of architects are ready to confess that best fidelity to his client, and consequent added stability in the building, mean the best interest of the insurance companies. We have learned, in short, that sound architecture begins at the point where a low-rate policy can be taken out. This being ideally true, it remains to find how it can become true in a wider and more general sense.

We assume that in the new and more confidential relation between architect and client, much can be done by the advice of the architect. In this matter the architect is primarily a professional adviser, whose technical assistance is directed toward purely architectural question; but he should be much more than this. He should assume the position of an adviser especially qualified by experience to suggest best methods of obtaining good interest from particular neighborhoods and especial classes of buildings; to demonstrate the degree of permanence necessary under each new condition, and in this and many similar ways to place at the service of his client his own larger experience of such questions.

Architects are much to blame whenever they are overridden by the mere caprice of clients in these essential matters of structure. Although there are fixed laws of taste and style in design, these laws are so elastic and their application so various that none but the craziest wish need lack architectural expression. But questions entering into the inner arrangement and structure of buildings are not to the same extent variable, and it is in these of all questions that an architect's greater experience should dominate the ignorance of his client. Very few laymen have the talent, knowledge or experience to make them self-confident in such matters. If in rare cases a thoroughly informed client knows more of them than his architect, then let the architect thank Heaven for an added source of knowledge, and "work it" for all it is worth. When, however, this ideal attitude is assumed between the planner and owner of the house, there must be potent arguments at the back of the architect, and these now and always will be money.

If the building be a dwelling, how much money does its owner lose interest on? To what advantage could he sell? What are to be his taxes and insurance? If the building is one for direct revenue, these and similar questions become more pertinent. Now of these inquiries the answer to one is in your hands, and the way in which you return that answer gives a direction to all the rest.

[1] A paper by J. W. Root, architect, read before the Fire Underwriters' Association of the Northwest, held at Chicago, September 8.

Have you not, in your eagerness to "do business," somewhat justified the attitude which people often assume towards you? Are the principles upon which you take out risks, and the examinations upon which your policies are based, so sound and careful that there lurks in them no invitation to that reckless indifference in house-builders which figures the insurance as part of the tangible value of the house?

Now, as in the past, the low-water mark of the cheapest building is exactly the high-water mark of your insurance rates; and the high-tide of thorough buildings is the low tide of your rates. Thus by governing to such large extent the interest of the owner, you determine the position of the architect.

I am confident that I speak for the best men in our profession when I say that we look for the time when you will be in all essential points the most unsparing critics of our buildings. Knowledge of this will only push us to better work and broader views; will add to the dignity of our profession, and incalculably strengthen our position with our clients. And this position of natural support and of friendly but thorough criticism, beneficent as it is to us, is of still greater value to the community at large.

In the large and infinitely complex social machine of which we are all parts, each independent action is productive of re-action throughout. Consider how deeply interwoven with the character of nations is the type of their houses. Well-built houses are the world over the best bulwarks to a national and individual conservatism. The family ties which have grown about some old stone dwelling are the firmer for its support: the commercial honor which has been housed within some venerable and time-defying warehouse is the keener and stronger for its walls and roof; the national or municipal pride which points to the hoary and weather-beaten hall where its liberties were born, holds those liberties the more sacred while that hall stands.

We, underwriters and architects, affected as deeply as we may be by our environment, have yet within our power to contribute to an almost equally deep influence upon that environment. To you a large part of the question seems to resolve itself into a wider range of rates, smaller at the top and larger at the bottom, making it very expensive business to build ill-considered fire-traps, and manifestly good "money sense" to build in the best way. In other words, to put into the widest practice that principle which has made it distinctly advantageous for capitalists to spend their money for such immense and indestructible buildings, as many which have been built in Chicago of late years.

I am not sure but action between underwriters and architects sufficiently concerted and prolonged may make it at least necessary to the existence of insurance companies that buildings shall present at least a superficial evidence of fire destructibility, while actually possessing the qualities of the Salamander.

This long-sighted as against the short-sighted policy is the service you can render us, and through us, yourselves.

Is it not time for the cessation in America of that most wonderful of all meteorological phenomenon — the simultaneousness of commercial panics and fires? Are we not as mere humanitarians interested to prevent, if in our power, those mysterious dispensations where a house goes off in smoke — cause supposed to be incendiary — loss complete — owner in anguish and tears — wear and tear of all the finer feeling beyond all money; loss of so many things about which the affections had entwined themselves — indignant resentment at impertinent questions — old rags and kerosene oil!

If it is a compliment to the innate rectitude of men that their youthful training makes villains of so few of them, is it not as great a compliment that the kinds of houses so largely occupied by them makes so few fire-bugs?

If we are now agreed upon this point in our relations to each other, let us pass to a rapid consideration of a few elements which enter into the construction of fireproof and non-fireproof buildings.

Of course we assume that the word "fireproof" is relative. He would be a bold man who would assert that any building could resist any conceivable fire. But we may assume as proof against all assault from all probable fires a type of building with which we are growing familiar. These, constructed with brick walls and iron well covered with fire-clay, with floors made of fire-clay arches, without galvanized-iron, wood or other destructible outside decoration; whose whole accessible structure in short has been made in the fire; these offer the nearest approach to absolute security from fire of anything since Mark Twain's coal mine.

But apart from these very costly structures designed to be absolutely fire-resisting, there is a large class of slow-burning buildings which when erected in large groups in a city, form a practically fireproof neighborhood, each individual building of which can be readily saved in case of fire. It is this class to which our attention should be more particularly directed. First let us glance at a few building materials, and then at their method of application.

Considered in their fire-resisting qualities, the first is fire-clay. This material has become of late years an invaluable adjunct to various classes of buildings, and it is safe to say that the near future will see it used in a vast number of directions now scarcely dreamed of. In its various forms it may be so cheaply made and so easily and inexpensively applied that there is no excuse for our relative indifference to it. It can be made in forms vastly lighter than brick, and consequently can be used in many cases where for reasons of support a brick wall is not possible. Moreover, being made in hollow or porous forms, its air-cells make it an ideal non-conductor of heat, and consequently but none the less valuable, an admirable "non-conductor of cold." On the cheaper methods of its application we will touch later in this paper.

Brick as the next of these fireproof materials must probably always hold its own. The cheapness of its manufacture, the ease and certainty of its use, the satisfactory artistic results obtained from its finer forms, all make it now what it was to the Romans, among the noblest of building materials. Terra-cotta is of course classed as brick, being in all respects a merely special form of brick, but better tempered in the clay, more carefully moulded and more thoroughly burned than most brick.

Iron has not held its own in the list of building materials. Of course we can't do without it, but it is always to be distrusted when freely exposed to the possible action of fire. Any high degree of heat in great measure impairs the efficiency of the material, or at best renders it liable to fracture under the sudden action of cold water. In the case of girders of wrought-iron, especially when exposed freely on three sides, the danger from heat is peculiarly great, because the tensile resistance of the metal is so much lessened. Even if under this weakened resistance of either iron beams or girders, the deflection is inconsiderable, it will probably be enough, in the case of girders, to drop the floor-joists resting upon them, or in the case of columns, to throw the direction of weight out of the axis of the column and so break or overturn it.

Many of our shop-fronts are built on iron girders carried across from post to post at the line of the second floor, and freely exposed. Here, although the chances are in favor of stability, yet the security would be greater, if these iron girders or lintels were covered with terra-cotta or fire-clay. If the iron lintels have no essential work to perform, as in the case of several of the newer large buildings, they may be safely left unprotected. For these and similar reasons iron cannot be regarded as an ideal fireproof material, especially when it is remembered how intimately connected all the parts of a building often are, and how fatal to the entire building may be the failure of one of its parts.

In all architectural work where iron has considerable weight to carry, it should therefore be protected from heat. The best thing for the purpose is probably some one of the various forms of fire-clay in common use. But when these are not to be obtained, or are for any reason too costly, a covering of asbestos in paper or fibre, or even of wood, provided the wood clasps the iron without intervening air-space (this condition is essential), is better than nothing.

The mechanical devices for applying fire-clay to iron may be obtained for reference from any one of the several firms engaged in this business.

Stone is now, as it has always been, the highest of all materials for building. Nothing can compare with it for the dignity of its expression and the facility with which it lends itself to all varieties of architectural expression. But regarded as a rival of iron in either its fire or time-resisting qualities, it must be conceded that it must take the second place.

Whenever stone enters very largely into the structure of a building, it is of the utmost consequence to know by actual test what is its action both under the direct contact of flame, and when suddenly cooled off by water. Nothing is stranger than the widely different performance of stone under fire; and I know of no means of predicting with anything like finality what a given kind of stone will do. Underwriters as well as architects are interested to see that all quarry owners furnish with their stone, not only tests of its water absorptive power and crushing resistance, but also of its precise action under great heat. Until this be known, absolute dependence on the integrity of a given kind of stone is unwise. This is especially true in walls faced with stone, and in piers of brick bonded with stone. In the first case, if the stone facing disintegrates under heat, the tendency is of course to make thinner places in the wall where this disintegration takes place, thus adding to the general tendency of the wall to fall outward. When, in the case of piers, the exposed edges of bond-stones are burned away, the efficient carrying area of the pier is reduced to a smaller and interior section, thus making it less safe, not only because of this diminished area, but also because few except such masons as built the wall of the New Jerusalem ever build the inside of a pier as well as the outside, and that part of the pier called upon to do the extra work is the part least able to do it. In all cases where stone, whose fire action is unknown, is used for piers, the pier should have considerable excess of size; and where such stone is used for wall-facing, the brick wall which "backs" it should be thick enough to all the work necessary for perfect stability without the stone.

Wood is, of all material used in building, that most generally understood. Any one who has, by slow and laborious degrees, learned to kindle a wood fire in an old-fashioned fireplace, knows by practice just how nearly fireproof wood may be. Wood, like paper, is very inflammable when cut thin and surrounded by an air space, but (always excepting certain highly resinous woods which burn under all conditions), when in large masses burns with comparative slowness. This peculiarity it was which made very slow burning a wood house constructed by the methods prevalent in England under Elizabeth and Anne, and in parts of New England in the early years of the last century. Wood, applied thus in large pieces, has the advantage over iron that the application of heat impairs its area only, without modifying the efficiency of the part which may remain, and the action of water upon it has no effect.

For these reasons it seems evident that for many purposes heavy solid wood posts and girders are preferable to a similar construction of unprotected iron — again assuming that we are not considering the few highly inflammable woods above mentioned.

Wood may also be protected by a number of cheap devices which greatly add to its efficiency. Preparations of creosote and other substances are made into fireproof paints, which are often treated by both underwriters and architects with neglect, because they do not do what they seem to profess — make the wood fireproof. But this they do not, or should not pretend to do. Their object is simply to retard combustion; and to sufficiently accomplish this is practically to solve the problem.

What has been said of wood has no relation to the use of it as we commonly see it, since, for reasons stated later on, the typical balloon-frame house, and the method commonly used in its construction, is just the principle used in the piling up of wood preliminary to a successful bonfire.

Asbestos is a material coming into larger use, from which we may expect results of importance. Whether used in fibre as a packing, or applied as a paper as an interlining, it is of very considerable value in retarding the progress of fire.

The same thing is true of such preparations of silica as "mineral wool," and of the substance called "fossil meal," and in an especial degree of plaster-of-Paris, whose use for fireproofing purposes is as general in Europe as it is rare here.

Two materials not yet in sufficient structural use to warrant an extended notice, but each possessing peculiar merits, are glass and paper. Glass is, perhaps, one of the most important of the building materials of the future, and its use will develop new applications of other materials for its protection from fire. Paper, in various compressed forms will also come into more or less general use, and will have the greater advantage that in bulk it burns very slowly, and that in its preparation for use it can be readily treated by chemical processes, so that it becomes nearly fireproof.

This is a slight sketch of the relation of a few familiar materials to fire. But more important than their inherent nature is the method of their use.

What are the most prominent reasons for the total destruction of buildings by fire? I do not doubt that any man of experience would answer: first, facility furnished for the rapid and unobstructed spreading of flames, which we may call "flues," and second, the falling out or in of parts of the burning building, which we will call "leverage."

First as to "flues." — It matters very little what a house is built of if only sufficient opportunity is provided for flames in one part to swiftly communicate with other parts without burning the intervening material. And yet, by a hundred ingenious devices these flues of communication are almost universally provided.

The typical American wooden house is generally constructed of light timbers set at small distances apart, and each timber has an open air-space on at least two sides of it, and often on three sides. The bottom of the flues thus constructed are frequently open, and generally open somewhere at the top; and in case they are closed at either the bottom or the top, the stopper is nothing more serious than a one-inch board, or one thickness of laths and plaster.

The same thing is true of almost all brick houses where, for reasons of cold and dampness, all inner surfaces of the walls have small wood strips set against them, to which are nailed the laths for plastering. This is, in America, the Universal Insurance-Company Extinguisher, Unlimited. Generally, the entire house is run through and through with these flues, which are by no means confined to outer partitions, but with almost equal frequency core out all the inner partitions as well. Then, having thus carefully provided a good circulation for the flames, the ingenious builder often provides a large shaft, or flue, open at both ends, and closed at each story only enough to make a good draught, and this large supplementary flue he calls an "elevator shaft," or "soiled-linen chute," or some other poetic and imaginative title.

Now, in all of these houses where is the fire first seen? Generally in the roof. Where does the fire start? Almost everywhere else. The bonfire thus carefully prepared has the peculiar merit of having each stick of wood provided with its own flue and draught; and the result is that the pile of sticks is at once burning at both ends. Is it cheaper to build this way? Not at all. The cost of the frills on one front gable or the crazy-quilt pattern of the stained-glass windows, would change the whole thing. The only care needed is, first, to make the flue as nearly fireproof as you can, and second, stop it up with something that will not burn. At the line of the various floors run out a board between the studs of the partitions, or between the furring on the brick walls. Fill up on this board two inches deep with the mortar left from the masonry and plastering, and the difference between this and the common form of wood or brick house is that this house, if it catches fire, can be saved; the other cannot. If the wood studs or furring strips have an inner-lining of asbestos paper, or an outer-lining also for wooden houses or partitions, the security is just that much greater.

The same flue system is generally carried through the floors of buildings, where the space between floor-joists from end to end is unobstructed. If this long space is cut into two or three fire-tight bulkheads by a piece of fire-clay tile or porous terra-cotta or brick, or, if there is nothing else, tin, the safety of the house is much enhanced.

Solidity is the measure of fire-resistance in a house; flue-idity is the measure of its fire-facility.

I can only allude to the principle involved here, which you will at once carry to its various conclusions.

Now, as to the question of "leverage." — Leaving out of question the ability of wall to stand alone and carry all the weight resting on it, the walls of buildings are generally forced over by some form of direct leverage. The floor-joists or beams generally have with the outer wall some fixed connection which, when the action of fire causes the joists or beams to fall down, holds them to the wall, forcing the wall to "buckle" and fall out and in. The action of this force, of course, depends on how heavily the floors are loaded. But the mechanical advantage of a weight thus applied to the wall for its destruction is very great; and it is a wall or partition of very great strength which will not yield to it. Falling under the application of this strain, the wall need not necessarily fall altogether inward; part of it may fall outward. Indeed, if the strain be applied at the extreme top, or even at the bottom, several reasons may make the wall fall both ways. With the precise action of this force we have now nothing to do; but it should be insisted upon by you that some method of anchoring wooden joists to walls be used of such character that the falling of the joists shall free this anchorage and leave the walls standing.

Over and above this point should be more carefully considered in the same connection, the mere lateral tying together of walls, so that it becomes more difficult for one wall to break away from another. This involves only a small matter of cost — a few pounds of ordinary hoop-iron well bonded into the walls being enough, but it often makes the difference between six and seven per cent in the yearly dividends of your companies.

The suggestions I have felt at liberty to make in this paper are very few; and I have endeavored, even at the risk of being commonplace, to be practical.

The essential element of the whole question of the relationship between architecture and fire-insurance lies very much deeper than any details of either architecture or fire-insurance. The relationship will be finally and happily adjusted at the moment when frank recognition of your interests by us is met by equally frank recognition and criticism of our work by you. The profession of underwriter cannot occupy its proper place alone. To give it its normal influence in the community — to insure its wider and deeper aims — it should enter with greater care and seriousness into the nature of the problems presented by that relationship we have been considering.

We, as architects, I trust you will find more and more willing to meet you half way in this adjustment; and the result of our mutual understanding and concerted action I believe must be of great good to the community.

A GEORGIA TURPENTINE FARM.

GATEWAY AND TOWER.
A.A. Sutton Photo. London. RATHENBURG, BAVARIA

DURING a recent trip through southern Georgia I was most particularly struck with the varied and general utility of the yellow-pine tree. Besides, it is a very peculiar tree in many respects. If you cut a girdle one inch deep, continuously all around the tree, it will die. The circulation of sap seems to be between the wood and bark, entirely, and the fleshy membrane, which is the medium of circulation, is tough and leathery, separating readily from sap or bark. Let this be severed and the largest pine is killed. This sap contains a great deal of saccharine matter and sours readily, so that fermentation during summer is transmitted from tree to tree, the death of one frequently causing the death of quite an area around it.

A "lightwood," or "pitch" pine, is about as solid after death as before. First the straw turns yellow and drops off, then the bark is gradually cast aside, and finally all that softer shell of recent growth, which is called the sap portion of the tree, and there is left a tree of resinous pine, with its roots embedded in the soil, and the storms of many centuries may beat in vain about its gaunt, skeleton-like form. These lightwood trees are of vast use to the inhabitants. They

make an underpinning for buildings as solid as brick. There is nothing in the world superior as post material, and for any frame-work that is constantly exposed to the weather, this resinous pine is used. It is impervious to water, and never rots. Then they make tar and charcoal of this lightwood, besides its universal use as fuel and kindling-wood.

A turpentine farm must be seen to be appreciated. When a farm is first pitched, the boxes are cut one to three in a pine, according to size. The trees are counted into crops of so many thousand, and this is called a virgin crop. The queer little gauge called a buck is then brought to bear and a streak is cut above the box, which is simply a deep oval notch, pointing downward so as to lead the gum which exudes into the box below. These boxes are made to hold about a quart. This first run is as clear as oil, and is the finest of all. After being dipped out with a paddle, it is distilled, and the hard rosin left is sometimes as white and clear as glass. It is very beautiful, and brings a good price in the great naval-stores markets. Second year's gum is not as good in quality, but fully so in quantity. Third year boxes, when the monthly hackings have made the scar high up, are still poorer, and from then on the crops hardly pay for working.

Just about the roughest beings that ever cursed a country are some of these turpentine negroes. They are paid by the box, $1 to $1.50 per hundred for box-cutting, and furnished so much rations. The old rule was a peck of meal, seven pounds of bacon, and a quart of syrup. Other provisions the darkey must pay for himself. They are given shanties to live in, and there, amid filth and vermin, they sleep and eat. Sometimes they will get together nights and sing and preach and pray until after midnight, and then, at the call of the woodsman, they are up and going by early dawn. Saturday evenings at the station they congregate, and, where whiskey is obtainable, there are scenes of the wildest sort. That is what caused so many of those wire-grass counties to go dry. Liquor demoralized the laborers to such an extent that it was ruinous. There is not so much money in turpentine as there was five years ago, but men still manage to farm it.

The great lumber mills are what eat the beautiful forests away most rapidly. This fine timber is equal to any in the world in many respects. In carpentry now it is frequently put on in panels with the natural color and polish of the wood exposed. Millions of dollars are invested in the manufacture of rough lumber in the forests. Tramways are built into the woods. Stockades are built out there for mules and timber carts, and the great logs many feet in length are transferred to the mill where they are rapidly cut into squared lumber, plank, or scantling, and this is loaded on cars for some seaport, thence finding its way to all parts of the habitable world. At some of the larger mills planers are run, and there are a few that employ a force of skilled mechanics who plan a house complete, cut all the parts for it, and then ship it West, where the buyer has nothing to do but put it together by the plans and numbers which accompany it.

The rail-splitter and new-ground clearer are two great mischief-makers. An ignorant backwoodsman, with a sharp axe, will deforest many acres in one day. He frequently gets it into his head that he will clear a certain field. He goes and girdles the trees, gets too lazy, too poor, or too indifferent to complete the job, and the land lies there for years, and becomes an "old deadening" almost worthless as a farm, and entirely so as a forest. The rail-splitter cuts down trees indiscriminately, because they are so plentiful, splits what he can, and leaves the balance to rot, and thus aids in the destruction of trees that it has taken many centuries to produce, and that with all his wood-craft he cannot contribute to the reproduction of. It is strange, but true, that the second crop of yellow pine is not at all like the primeval growth. It is not so solid, so abundant in rosin, nor has it any of the good timber qualities of the original growth. Once gone the yellow pine is gone forever.

If not exposed to the weather the sap pine will last well. The log-houses are generally built of the sapling pines. They are long and straight, and when pealed carefully are of snowy whiteness. I noticed one old building that has stood the test of half a century, and it seems to be all right yet. This house is a fair sample of all the others of that day and time. It was built of logs, notched onto each other at the corners, the whole structure resting on two light-wood sills that lay on the ground. The roof was made of rough clap-boards, riven out of bent pine, and the cracks and gables were ceiled with long strips drawn smoothly and nailed neatly on. The floor was of hard red clay, beaten into mortar, and then put down and packed until hard and smooth. Apertures were cut for the two doors, and the shutters were made of riven boards. The chimney was made of a layer of solid pine sticks, penned all round, then a layer of red-clay mortar, another of sticks and so on to the top. House and chimney are still standing, although a whole family of children have been born, grew up and married, and none but the aged pair who came there in the flush and heyday of youth are left to bear witness. There is a something about these pine trees that is wonderfully fascinating to me. I look up at their tall, trim, soldierly bodies and try to imagine how many lifetimes old they are. The dust of many generations of men must mingle around their strong roots. Could they but speak and tell of the scenes they have witnessed! Ah! they do speak, if you will but bend your ear to watch their low, soft whispers as I have done so many, many times. They have taught me things deeper than the love of the woods, and in my thoughtful moods I have found the sweetest enjoyment in the lonely companionship of their brooding silence. — *Atlanta (Ga.) Constitution.*

NOTES & CLIPPINGS

THE "POOR SINNER'S" BELL AT BRESLAU. — The city of Breslau celebrated the five hundredth anniversary of an occurrence which was memorable in the history of the town and is known wherever German poetry finds a home. The bell which hangs in the southern tower of St. Mary Magdalen's Church and is named "St. Mary's bell," but is usually known as "the poor sinner's bell," rang out morning and evening on the 17th of July to remind all who heard it that it was cast on that day 500 years ago. Next day (Sunday) the preacher reminded his congregation of the pathetic story which has made it singular among bells, how, when all was ready for casting, the bell-founder withdrew for a few moments, leaving a boy in charge of the furnace, warning him not to meddle with the catch that secured the seething metal in the cauldron. But the boy disregarded the caution, and then, terrified on seeing the molten metal beginning to flow into the mould, called to the bell-founder for help. Rushing in and seeing what he had intended to be his masterpiece ruined, as he thought, angered to madness, he slew the boy on the spot. When the metal had cooled and the mould was opened, the bell was found to be an exquisite work, perfect in finish, and of marvelous sweetness of tone. Coming to his senses, he recognized his bloody work and straightway gave himself up to the magistrates. "Blood for blood" was the law; he was condemned to die, and he went to his doom while his beautiful bell pealed an invitation to all to pray for "the poor sinner," whence its name. W. Muller has enshrined the sad story in a ballad of touching simplicity:

"War einst ein Glockengiesser
Zu Breslau in der Stadt."

— *London Times.*

THE NEW CEMETERY OF STE MARTHE, PARIS. — Paris population is making such progress that her cemeteries have become too small for her dead. A new necropolis will be opened in a few weeks, and an entirely new design introduced in the model and management of Parisian sepulture. Père-la-Chaise and Montmartre are very interesting from the great names that may be found on the tombs, but otherwise, a visit to them leaves a dismal impression on the mind. The cemetery, the ground of which has just been purchased by the Municipal Council close to Aubervilliers, will be laid out more after the English model. It will be a public garden, almost a park, planted with trees so as, so far as it is possible, to hide the tombs and monuments. It will be limited to contain 156,000 dead, but in France, unlike England, the right to the ground is limited to five years, so that the graves can only be sold for a strictly calculated sixty months. One strange innovation will make this cemetery of Ste. Marthe very memorable in the history of sepulture as conducted by the State. It will have no chapel. A "reception building" has been constructed, where the minister of whatever religion the dead belong to will receive the coffin, where the friends will assemble, where the last rites will be performed, and the funeral discourses will be pronounced. But though prayers will be pronounced in this edifice, its façade will display no cross, and no sacred inscription will be read upon its portals. It is strange that, as yet, we hear nothing in connection with this building about cremation. In Italy the Pope has discountenanced the practice, but the cemetery of Ste. Marthe is a secular building. The whole principle which guides its construction, its arrangement, and its management is in antagonism to the priest party, and yet this latest scientific institution provided for the old cemeteries finds hitherto no countenance in the new. There may, indeed, be changes before the first of October, the date of the first interment. — *Pall Mall Gazette.*

REMARKABLE EXCAVATIONS AT JERUSALEM. — An interesting account is given in some Vienna and German papers of excavations made by the French Dominican monks at Jerusalem on some land which they have lately acquired, about a furlong and a half outside the gate of Damascus. Six metres below the present level of the ground the workmen came on some arches of considerable extent, the walls of which had been very carefully built. At a short distance they found the basement of a chapel, before the entrance of which there was a tomb-stone covered with a long inscription. Unfortunately, this stone was stolen before any one thought of copying the inscription, and no trace of it could be obtained. About the middle of their property they found a large, well-preserved mosaic, and upon the space all around being cleared the bases and other remains of great pillars were discovered. It is presumed that this is the site of the great basilica built in the fifth century in honor of St. Stephen by Eudoxia, the wife of Arcadius, the first of the long line of Eastern emperors. Still more remarkable is the discovery made just on the boundary of the estate. While digging the trench for the foundations of the boundary wall which the Dominicans wished to build the ground gave way, and one of the workmen disappeared. On clearing out the place they came on a large and beautiful hall, which had been cut out of the rock; where the rock failed the gap was filled by admirable masonry. From two of the sides two large doorways led into two vaulted tombs, all of equal size. On each side of the vault there was a resting-place for one coffin, and at the end opposite the entrance places for two. At the furthest end of the great hall a passage led to another excavated vault, in which stood three great covered sarcophagi. It is suggested that these sarcophagi contain the remains of Helena, Queen of Abiadenos, and her sons. The quantity of bones found in these chambers was very great. In the middle of the great hall in a hollow specially prepared, a sort of long metal box was found. It was adorned with representations of children holding garlands up on high. Unfortunately, there was no inscription, nor anything which could furnish a clue to the period or the purpose of these sepulchral chambers. — *London Times, August 23.*

The Sphinx and New Discoveries.—The Sphinx occupies a position where the encroachment of the desert is most conspicuous. At the present day nothing is to be seen of the animal except its head and its neck; but the old Egyptian monuments on which it is figured show not only the entire body down to the paws, but also a large square plinth beneath, covered with ornaments. Since the time of the Greeks, perhaps even since the reign of Thothmes IV, this plinth has disappeared beneath the sand, and its very existence had been forgotten. It is generally supposed that the Sphinx is hewn out of a large isolated rock, which overlooked the plain. But M Maspero's researches suggest that it is a work yet more stupendous. He has proved that the sphinx occupies the centre of an amphitheatre, forming a kind of rocky basin, the upper rim of which is about on a level with the head of the animal. The walls of this amphitheatre, whenever visible, are cut by the hand of man. It seems probable, therefore, that in the beginning there was a uniform surface of rock, in which an artificial valley has been excavated, so as to leave in the middle a block out of which the Sphinx was finally hewn. The excavations now being carried on will doubtless verify the existence of the plinth shown on the old paintings, and also furnish evidence, by the ornamentation of the plinth, of the true age of the monument. M. Maspere is inclined to assign to it a very great antiquity — possibly higher than the early dynasties, *i. e.*, than the first period of Egyptian history. As the result of last winter's work the sand round the Sphinx has already been lowered by about 30 metres.— *The Academy.*

The Century's Rise of Wages.—Discussing wages, in one of his lectures before the students of Harvard University, Professor Thompson gives many facts of curious interest. In 1793 the Schuylkill and Susquehanna Canal Company advertised for workmen, offering $5 a month for the winter months, and $6 for summer, with board and lodging. The next year there was a debate in the House of Representatives which brought out the fact that soldiers got but $3 a month. A Vermont member, discussing the proposal to raise it to $4, said that in his State men were hired for £18 a year, or $4 a month, with board and clothing. Mr. Wadsworth, of Pennsylvania, said: "In the States north of Pennsylvania the wages of the common laborer are not, upon the whole, superior to those of the common soldier." In 1797 a Rhode Island farmer hired a good farm-hand at $3 a month; and $5 a month was paid to those who got employment for the eight busy months of the farmer's year. A strong boy could be had at that time in Connecticut at $1 a month through those months, and he earned it from working from daybreak until eight or nine o'clock at night. He could buy a coarse cotton shirt with the earnings of three such months. The farmers could pay no better, for the price they got for produce was wretched. Butter sold at eight cents a pound, and when it rose suddenly to ten cents several farmer's wives and daughters went out of their minds with the excitement. Women picked the wool off the bushes and briars, where the sheep had left it, and spun and knit it into mittens to earn $1 a year by this toilsome business. They hired out as help for twenty-five cents a month and their board. By a day's hard work at the spinning-wheel a woman and girl together could earn twelve cents. As late as 1821 the best farm-hands could be had for twenty-five cents a day, or twice as much in mowing time. Mathew Carey, in his Letters on the Charities of Philadelphia (1829), gives a painful picture of the working classes at that time. Every avenue to employment was choked with applicants. Men left the cities to find work on the canals at from sixty to seventy-five cents a day, and to encounter the malaria, which laid them low in numbers. The highest wages paid to women was twenty-five cents a day, and even the women who made clothes for the arsenal were paid by the Government at no higher rates. When the ladies of the city begged for an improvement of this rate, the Secretary hesitated lest it should disarrange the relations of capital and labor throughout the city! Poor people died of cold and want every winter in the city, and the fact seems to have made an impression only on benevolently disposed persons like Mr. Carey.

Fog Ponds.—Many of the archaic methods which met the requirements of ruder ages have, from their simplicity, efficiency and economy, continued in use amidst the improved conveniencies of modern science. Dependent as were the men of other days upon the phenomena of nature more directly than in our times, they found many ways of increasing the benefits thereby obtained, which are still in use and likely to be so until the end of time. Water-supply for flocks pastured on wide chalk-downs would appear a peculiar difficulty; far from streams, high above water-bearing strata, too remote from any publicly-organized system; nevertheless, the fog-pond has supplied the sheep farmers of many a dry down with necessary water. Gilbert White, writing in 1776, remarks: "To a thinking mind few phenomena are more strange than the state of little ponds on the summits of chalk-hills, many of which are never dry in the most trying droughts of summer. We have many such little round ponds in this district, and one in particular on our sheep-down, 300 feet above my house, which though never above 3 feet deep in the middle, and not more than 30 feet in diameter, yet never is known to fail, though it affords drink for 300 or 400 sheep, and for at least 20 head of large cattle beside." The simple operation of making a fog-pond, as noticed on the downs near Worthington in the summer of 1881, is as follows: The selected spot, on the slope (in this case almost at the summit) of the downs is unturfed, the turf removed, and the chalk dug out to form a saucer-shaped depression, the surplus chalk being deposited on the lower side, forming an embankment. Water is then thrown on the bottom, and a horse, harnessed to a small implement having several wheels something like those of a clod-crusher, is walked round and round, thereby working the whole of the invert into a slurry. This operation is continued for three days, the horse and wheels going their monotonous round deep in the white mud, which, when sufficiently worked, is dressed to an approved segmental shape and forms a retentive basin, not liable to crack, like a clay lining during dry weather. The supply is, to some extent, assisted by storm water running down over the saturated turf, but its chief source is atmospheric moisture, which condenses in quantities marvellous to those who have not noticed the fact. The before-named naturalist observes: "Hence we see that the air, when loaded with fogs and vapors, and even with copious dews, can alone advance a copious and never-failing resource." The working of the chalky bottom was formerly done by the feet alone, of horses or men, and the whole process is still carried out in a traditionary manner by the local peasantry of those districts where fog-ponds are used.— *The Builder.*

TRADE SURVEYS

The greatest source of danger just now to the improving commercial and industrial situation is the probability of overproduction. Overproduction ought to be impossible as long as reasonable human necessities are not provided for in the shape of food, clothing, house-room, and a surplus sufficient to meet the reasonable demands of taste. The capacity and willingness to labor is sufficient to meet these demands and much more, but the faulty distributive agencies employed create, at frequent intervals, an apparent but grossly deceptive over-production, which reacts disastrously upon all interests. It would be a grand step of progress to overcome this difficulty and to establish the harmony between productive and distributive agencies. This is the coming social and social-economic problem. It underlies nearly everything in the world of business and is the secret power and force behind labor organization and commercial and industrial competition. To sell all that can be produced is the question, the problem. There is a place, a demand for all that can be produced, but the selling of this possible production is impossible under existing systems. Anarchists and socialists are the illegitimate product of an insane endeavor to forcibly right the disorders, if such they are, which prevent that harmonious distribution which will permit the fullest activity of productive agencies. The agitation is world wide. The Royal Commission in Great Britain has been endeavoring to furnish a scientific diagnosis of the case. The Governments of Europe prefer to furnish an antidote in the shape of costly military establishments. Employers and employed on this side are seeking, by organization, to establish better conditions and relations, by which the pent-up energies of labor can be more regularly employed. There ought to be no such difficulty, and why there is one is not easily to be explained, except that it is the order of nature which obstructs the pathway of human progress by an endless succession of difficulties in the overcoming of which lies progress and development.

Just now all productive agencies are engaged beyond average activity. The depression in cost of production during the past two or three years has paved the way for present results. The rich are making less and the poor are making more. The volume of loanable capital is relatively increasing and its cost for use is declining, while the compensation of labor is increasing. Banking institutions are springing up in Western States, attracted thither by the more remunerative rates. The movements in financial channels within two or three weeks confirm previous observations concerning the migratory character of capital. The railroad, the manufacturing and the building interests find much stimulus in this tendency. The smaller cities and towns feel the effects in building activity. The people are instinctively following up organization to secure by united action what is individually impossible. Building associations, beneficial organizations for insurance purposes, trade organizations for regulating production and competition, are all multiplying, especially in the Western States. Since September 1, a fresh impulse seems to have been imparted to small house building, especially in manufacturing localities in Ohio, Indiana, Illinois, Iowa, and two or three Northwestern States. Lumber authorities make special mention of a large distribution recently in those States, and of such a degree of inquiry as is likely to ensue more satisfactory prices for building lumber. People have practiced not only a commendable economy, but have developed business talent and foresight which has resulted in a conservation both profitable and wise. Real estate is holding its own everywhere. Equalizations are going on, in values. Rents are adjusting themselves. In some places they have declined, and in others have advanced. There are none of the wild values of a few years ago. Stocks are steady. Dealings are legitimate. Purchasers are purchasing to hold rather than speculate. The lumber interests anticipate an unusually good winter. The Southern yellow-pine interests aim at more harmonious working hereafter. The lumber manufacturers of the Northwest met at Chicago on Thursday. The aim of this association is to regulate log and lumber production. It has exerted much less influence than circumstances demanded and just now it should raise its united voice against a winter overcrowding of mills. All large cities and towns throughout the West and Southwest are consuming immense quantities of mill products. Business in lumber has improved throughout the Middle and New England States. The possibilities of a shortage of logs and lumber has had a good effect in stimulating backward buyers in almost all markets. The output of mills in all sections is being steadily disposed of at good prices. All Atlantic markets are in good shape. Hemlock in Pennsylvania has advanced on account of low water and spruce is threatened with an advance in New England markets because many water-mills are shut down. Yellow pine is in fair supply, but not abundant, and commands good prices. There is a toning-up of prices at New York and Philadelphia just sufficient to impart a vigorous feeling to the market. In planing-mill work orders are being crowded through. The iron and steel industries are still gaining. Business is abundant. Bridge-building contracts for large quantities are soon to be placed; in fact, last week three thousand tons of material were contracted for in Pennsylvania mills. The coming year will be an important one to bridge-builders. Merchant bar-iron has advanced $2 per ton for refined, but medium is steady. Common is higher because of $21 to $22 old iron rails. Steel rails are $34 for spring delivery and $35 for winter. Merchant steel orders are crowding mill capacity and pig-iron demand is preventing any accumulation of stocks. Wrought-iron mills have more business engaged than can be executed before frost. Nail production is curtailed at Pittsburgh, but elsewhere is up to maximum capacity. No restriction of production is thought of; on the contrary, all energies are bent to expansion. All consumers are buying with activity and confidence, and makers are barely able, even at the present unprecedented rate of production to keep even with demand. As previously remarked, this activity may lead to too great output, but the probabilities are not so great. Steel is supplanting iron in all directions. The industrial outlook is certainly attracting much capital, but as a more equitable distribution is effected, the permanency of the demand is more and more assured. The autumn and winter months will be months of heavy demand, firm prices, and extension or capacity in all the greater and most of the lesser industries, and by the opening of spring the crisis will have been reached.